

Test Report for FCC Part 15 Subpart B & C

of

Product Name

WLAN 802.11B/G CF MODULE

Model

DRCM-81

Applied by:

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Test Performed by:

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ISL-T10-R2-3

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1. General

1.1 Certification of Accuracy of Test Data

Standards: CFR 47 Part 15 Subpart B Class B
CFR 47 Part 15 Subpart C (Section 15.247)

Test Procedure: ANSI C63.4:2003

Equipment Tested: WLAN 802.11B/G CF MODULE

Model: DRCM-81

Applied by: Wistron Neweb Corporation

Sample received Date: 2006/06/28

Final test Date : 2006/06/27-2006/06/29

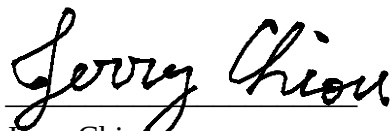
Test Result PASS

Test Site: Chamber 02, Conduction 02

Temperature Refer to each site test data

Humidity: Refer to each site test data

Test Engineer:


Jerry Chion

All the tests in this report have been performed and recorded in accordance with the standards described above and performed by an independent electromagnetic compatibility consultant, International Standards Laboratory.

The test results contained in this report accurately represent the measurements of the characteristics and the energy generated by sample equipment under test at the time of the test. The sample equipment tested as described in this report is in compliance with the limits of above standards.

Approve & Signature



Eddy Hsiung/Director

Test results given in this report apply only to the specific sample(s) tested under stated test conditions. This report shall not be reproduced other than in full without the explicit written consent of ISL. This report totally contains 64 pages, including 1 cover page, 2 contents page, and 61 pages for the test description. This report must not be used to claim product endorsement by NVLAP or any agency of the U.S. Government.

This test data shown below is traceable to NIST or national or international standard. International Standards Laboratory certifies that no party to this application has been denied the FCC benefits pursuant to Section 5301 of the Anti-Drug Abuse Act of 1988, 21 U.S.C. 853(a).

2. Test Results Summary

The 802.11b functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

The 802.11g functions of EUT has been tested according to the FCC regulations listed below:

Tested Standards: 47 CFR Part 15 Subpart C			
Standard Section	Test Type	Result	Remarks
15.207	AC Power Line Emissions	Pass	
15.247(a)(2)	Spectrum Bandwidth Of DSSS device	Pass	
15.247(b)	Max. Peak Output Power	Pass	
15.247(c)	Radiated Emissions 30MHz – 25 GHz	Pass	
15.247 (c)	Band Edge Measurement	Pass	
15.247(b)(4)	Radiation Exposure	Pass	MPE report attached
15.247 (d)	Power Spectral Density	Pass	

3. Description of Equipment Under Test (EUT)

Description:	WLAN 802.11B/G CF MODULE
Model No.:	DRCM-81
Frequency Range 802.11b/g:	2400~2483.5 MHz
Support channel: 802.11b/g	11 Channels
Modulation Skill: 802.11b	DBPSK(1Mbps), DQPSK(2Mbps), CCK(5.5/11Mbps)
802.11g	OFDM (6M - 54Mbps)
Antennas Type:	
Antenna 1: Dipole	(F1B-204406-52, made by Long-Chu Co.)
Antenna 2: Dipole	(C478-510028-A, made by Wha Yu Co.)
Antenna Connected:	The antenna is connected to the RF connector of the WLAN adapter.
Antenna peak Gain:	
Antenna 1:	1.82 dBi (11b/g)
Antenna 2:	2.5 dBi (11b/g)
WLAN Power Type :	3.3V DC from the EUT

The channel and the operation frequency of 802.11b and 802.11g is listed below:

Channel	Frequency(MHz)	Channel	Frequency(MHz)
01	2412	07	2442
02	2417	08	2447
03	2422	09	2452
04	2427	10	2457
05	2432	11	2462
06	2437		

During the test, the EUT was tested as a modular device of a notebook PC using a PCMCIA extender board to extend the EUT outside the notebook PC enclosure. There are two Dipole antennas in the EUT:

All of antennas have been tested. The worse data of each antenna type are shown. Configuration list as below:

DRCM-81	PIFA Antenna
802.11b/g	Antenna 2

4. TEST RESULTS (802.11b)

4.1 Powerline Conducted Emissions [Section 15.207]

4.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

4.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

4.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

4.1.4 Test Data:

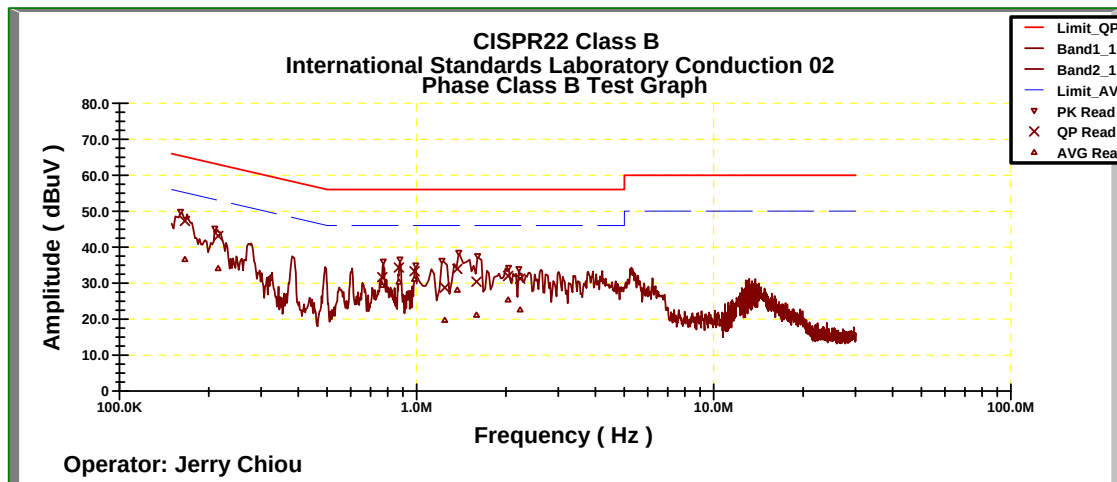
Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature (C): 25

Humidity (%): 56

Frequency	LISN Loss	Cable Loss	QP Corrt.	QP Limit	QP Margin	AVE Corrt.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.16615	0.10	0.03	47.26	65.54	-18.28	36.61	55.54	-18.93
0.21498	0.11	0.05	43.11	64.14	-21.03	34.09	54.14	-20.06
0.7661	0.20	0.07	31.65	56.00	-24.35	29.38	46.00	-16.62
0.87213	0.20	0.07	34.32	56.00	-21.68	30.33	46.00	-15.67
0.98418	0.20	0.07	33.28	56.00	-22.72	31.10	46.00	-14.90
1.24436	0.22	0.07	28.74	56.00	-27.26	19.67	46.00	-26.33
1.37077	0.24	0.08	33.92	56.00	-22.08	28.03	46.00	-17.97
1.59037	0.26	0.08	30.39	56.00	-25.61	21.11	46.00	-24.89
2.03272	0.30	0.09	31.97	56.00	-24.03	25.32	46.00	-20.68
2.22993	0.31	0.10	31.23	56.00	-24.77	22.56	46.00	-23.44



* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1 , 6, 11 to get the maximum reading of all these channels.

Margin = Amplitude + Insertion Loss- Limit

A margin of -8dB means that the emission is 8dB below the limit

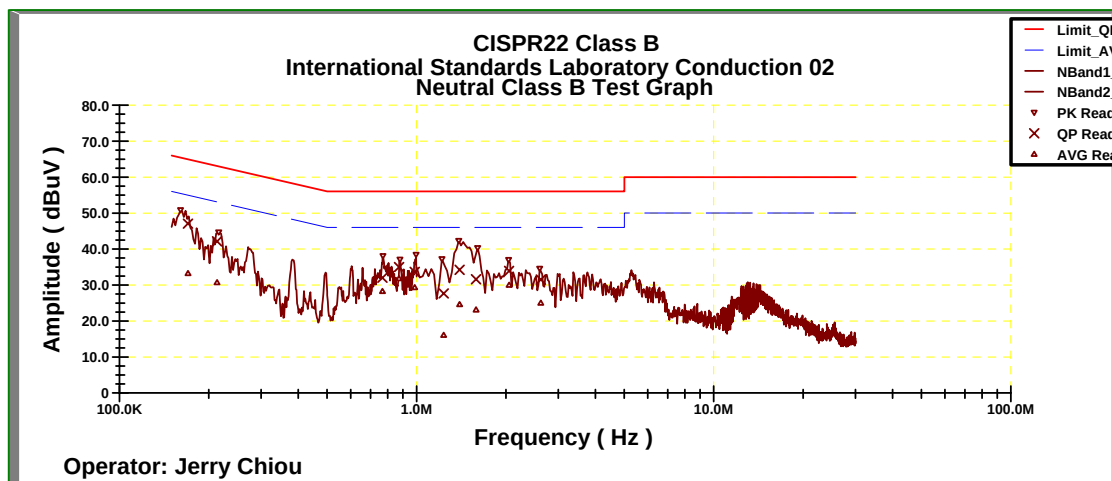
Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature (C): 25

Humidity (%): 56

Frequency	LISN Loss	Cable Loss	QP Corrct.	QP Limit	QP Margin	AVE Corrct.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.17016	0.40	0.03	47.05	65.42	-18.37	33.22	55.42	-22.21
0.21318	0.40	0.05	42.12	64.19	-22.07	30.66	54.19	-23.53
0.76765	0.40	0.07	32.00	56.00	-24.00	28.24	46.00	-17.76
0.87251	0.40	0.07	34.98	56.00	-21.02	31.80	46.00	-14.20
0.98525	0.40	0.07	33.63	56.00	-22.37	29.28	46.00	-16.72
1.23378	0.50	0.07	27.64	56.00	-28.36	16.02	46.00	-29.98
1.39522	0.50	0.08	34.22	56.00	-21.78	24.59	46.00	-21.41
1.58497	0.50	0.08	31.57	56.00	-24.43	23.10	46.00	-22.90
2.04712	0.50	0.09	33.92	56.00	-22.08	29.96	46.00	-16.04
2.61833	0.50	0.11	31.50	56.00	-24.50	24.98	46.00	-21.02



* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1, 6, 11 to get the maximum reading of all these channels.
Margin = Amplitude + Insertion Loss- Limit
A margin of -8dB means that the emission is 8dB below the limit

4.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

4.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz

4.2.2 Test Setup



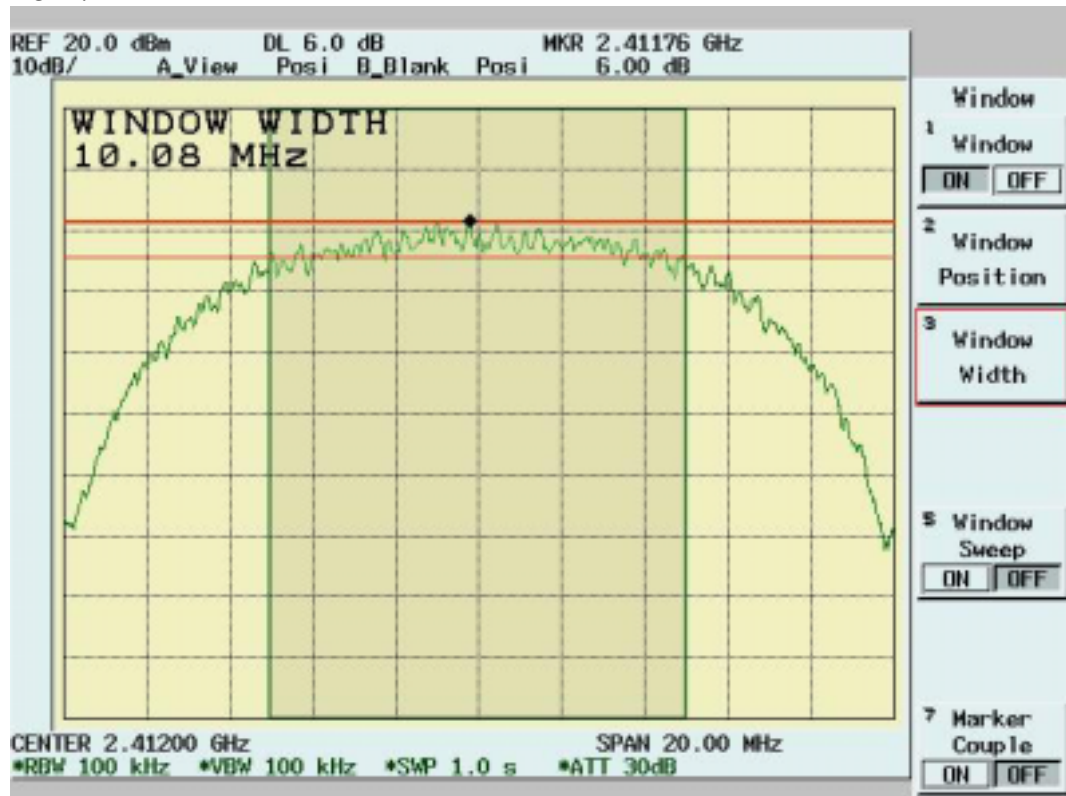
4.2.3 Test Data:

6dB Bandwidth

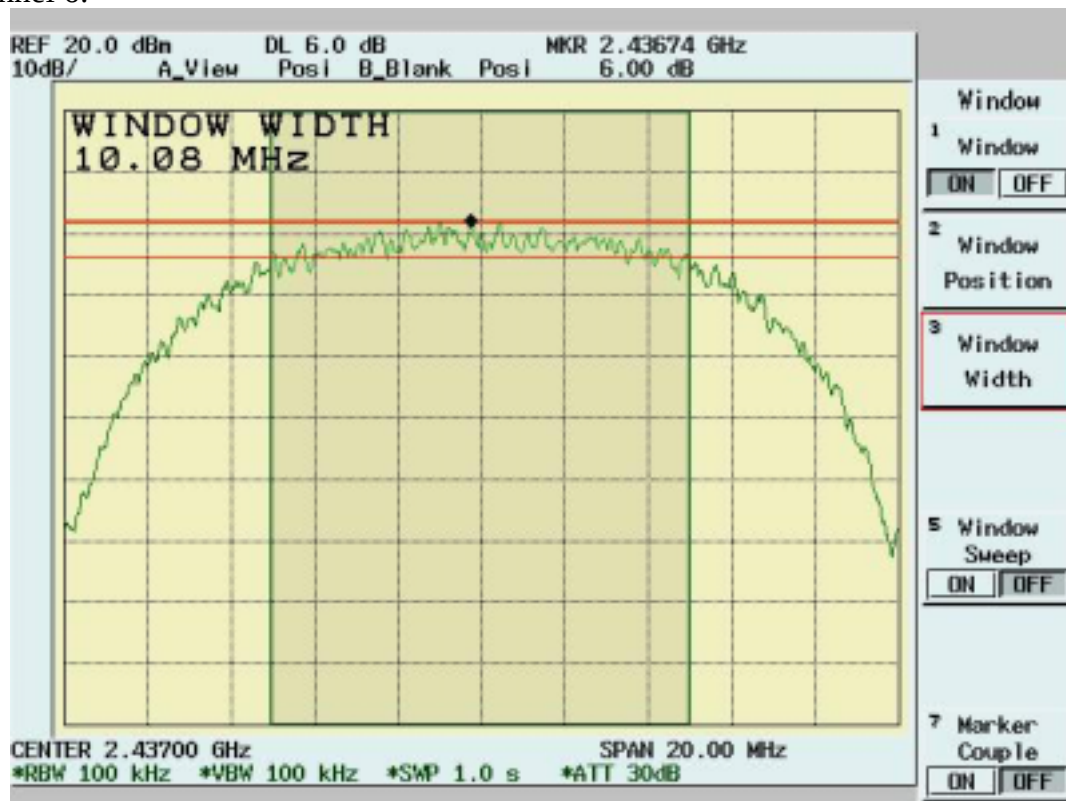
Temp. (deg. C): 25
 Humidity (%): 50
 Test Engr: Jerry Chiou

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	10.08	0.5	Pass
6	2437	10.08	0.5	Pass
11	2462	10.04	0.5	Pass

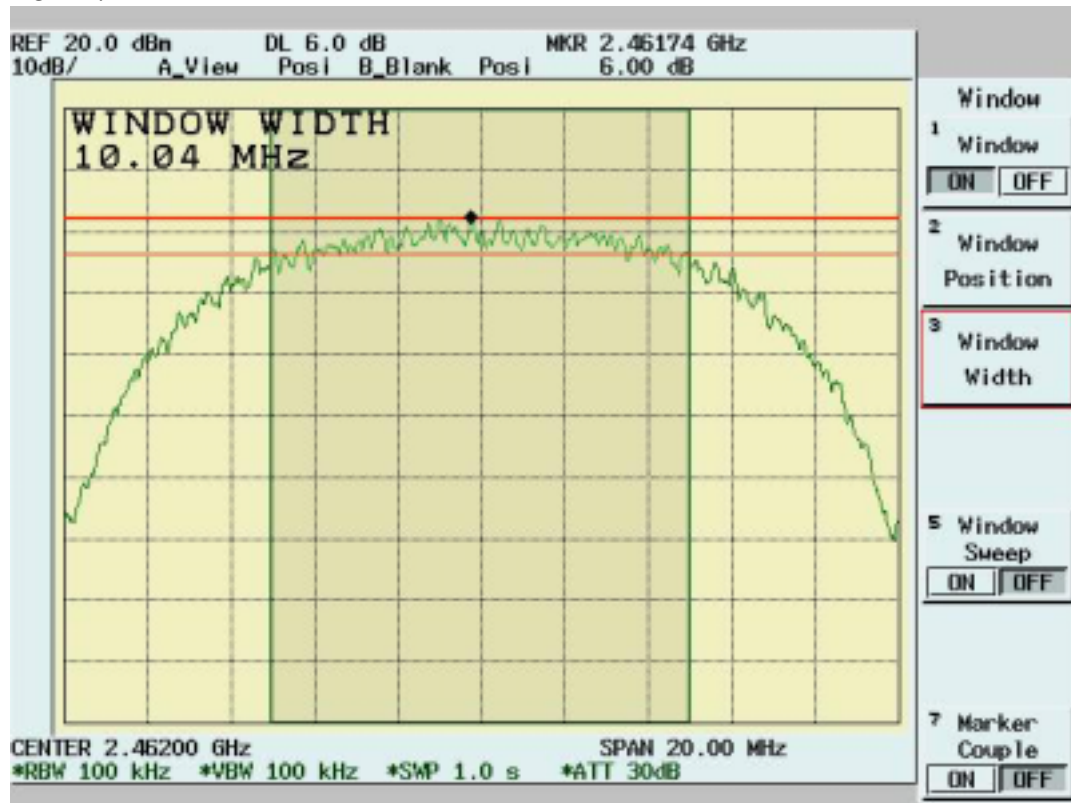
Channel 1:



Channel 6:



Channel 11:

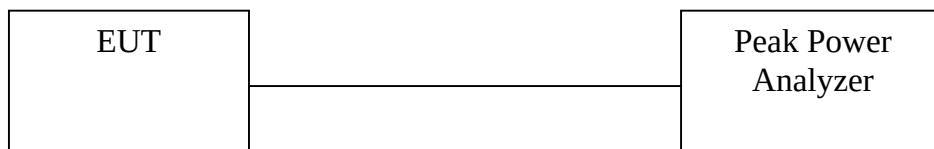


4.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

4.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

4.3.2 Test Setup



4.3.3 Test Data

Maximum Peak Output Power

Temp. (deg. C): 25

Test Engr: Jerry Chiou

Humidity (%): 50

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	14.2	1.1	33.88	15.3	30	Pass
6	2437	14.9	1.1	39.81	16	30	Pass
11	2462	15.21	1.1	42.76	16.31	30	Pass

4.4 Radiated Emission Measurement [Section [15.247(c)(4)]

4.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

4.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2nd to 10th harmonics frequencies, the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

4.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

4.4.4 Test Data (30MHz – 1GHz):

30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature (C): 23

Humidity (%): 54

Frequency	Rx Amp.	Ant Fact	CableLoss	PreAmpGain	Corrct. Emi.	Limit	Margin	Ant. Pos.	Table Pos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
35.82	4.84	14.71	1.07	0.00	20.62	40.00	-19.38	196.00	245.00
95.96	14.31	9.49	1.91	0.00	25.71	43.50	-17.79	103.00	353.00
159.98	17.95	8.70	2.35	0.00	29.00	43.50	-14.50	196.00	188.00
186.17	13.40	8.56	2.65	0.00	24.61	43.50	-18.89	196.00	6.00
199.75	12.45	8.89	2.70	0.00	24.04	43.50	-19.46	196.00	23.00
239.52	24.94	10.14	3.03	0.00	38.11	46.00	-7.89	103.00	304.00
320.03	15.41	16.02	3.83	0.00	35.25	46.00	-10.75	103.00	123.00
404.42	5.96	15.93	4.47	0.00	26.36	46.00	-19.64	103.00	189.00
449.04	4.95	16.19	4.86	0.00	26.00	46.00	-20.00	103.00	321.00
499.48	4.70	17.39	5.28	0.00	27.37	46.00	-18.63	196.00	23.00
664.38	0.65	19.00	6.40	0.00	26.04	46.00	-19.96	103.00	8.00
832.19	1.44	20.42	7.71	0.00	29.57	46.00	-16.43	103.00	57.00

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature (C): 23

Humidity (%): 54

Frequency	Rx Amp.	Ant Fact	CableLoss	PreAmpGain	Corrct. Emi.	Limit	Margin	Ant. Pos.	Table Pos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
57.16	16.48	6.00	1.31	0.00	23.79	40.00	-16.21	203.00	188.00
95.96	15.62	9.49	1.91	0.00	27.02	43.50	-16.48	103.00	171.00
239.52	14.85	10.14	3.03	0.00	28.03	46.00	-17.97	203.00	89.00
320.03	8.48	16.02	3.83	0.00	28.33	46.00	-17.67	103.00	7.00
359.8	6.53	16.14	4.17	0.00	26.85	46.00	-19.15	203.00	89.00
499.48	5.11	17.39	5.28	0.00	27.78	46.00	-18.22	103.00	73.00
539.25	3.69	18.34	5.45	0.00	27.48	46.00	-18.52	103.00	56.00
629.46	1.59	18.88	6.15	0.00	26.62	46.00	-19.38	203.00	56.00
640.13	2.80	18.94	6.23	0.00	27.98	46.00	-18.02	103.00	105.00
661.47	2.92	19.00	6.38	0.00	28.30	46.00	-17.70	103.00	303.00
731.31	0.95	19.75	6.88	0.00	27.57	46.00	-18.43	103.00	138.00
943.74	1.07	21.21	8.40	0.00	30.69	46.00	-15.31	103.00	253.00

NOTE:

- During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.

- Margin = Corrected Amplitude – Limit

Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain

A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

4.4.5 Test Data (1GHz – 25 GHz) .

1GHz~ 25 GHz (Horizontal), Channel 1: 2412 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
2838.16	47.33 pk	31.04	1.42	34.90	44.89 pk	54.00 av	-9.11	103	306
2938.06	47.13 pk	31.08	1.44	34.81	44.84 pk	54.00 av	-9.16	103	338
4818.18	64.55 pk	34.91	2.12	37.71	63.88 pk	74.00 pk	-10.12	100	18
4818.18	52.68 av	34.91	2.12	37.71	52.00 av	54.00 av	-2.00	100	18

1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
1162.34	51.69 pk	25.25	2.19	34.02	45.11 pk	54.00 av	-8.89	102	101
1844.16	47.46 pk	29.69	2.48	34.87	44.76 pk	54.00 av	-9.24	100	54
2281.22	47.58 pk	30.94	1.74	35.19	45.07 pk	54.00 av	-8.93	101	131
2910.59	47.38 pk	31.06	1.43	34.83	45.05 pk	54.00 av	-8.95	103	329
4818.18	57.86 pk	34.91	2.12	37.71	57.18 pk	74.00 pk	-16.82	100	18
4818.18	47.04 av	34.91	2.12	37.71	46.36 av	54.00 av	-7.64	100	18

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal) , Channel 6 : 2437 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
1159.84	50.80 pk	25.24	2.19	34.02	44.20 pk	54.00 av	-9.80	102	101
2071.43	46.44 pk	30.99	2.38	35.18	44.62 pk	54.00 av	-9.38	100	65
4861.64	62.20 pk	35.07	2.13	37.76	61.65 pk	74.00 pk	-12.35	100	14
4861.64	50.55 av	35.07	2.13	37.76	49.99 av	54.00 av	-4.01	100	14

1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency MHz	Rx_R. dBuV	Ant_F. dB/m	Cab_L. dB	PreAmpl dB	Emission dBuV/m	Limit dBuV/m	Margin dB	A.Tower cm	T.Table deg
1844.16	48.45 pk	29.69	2.48	34.87	45.75 pk	54.00 av	-8.25	100	54
2316.18	47.04 pk	30.94	1.64	35.19	44.42 pk	54.00 av	-9.58	101	142
2391.11	47.08 pk	30.92	1.42	35.20	44.22 pk	54.00 av	-9.78	101	166
2625.87	46.95 pk	30.95	1.38	35.09	44.20 pk	54.00 av	-9.80	102	240
4861.64	58.59 pk	35.07	2.13	37.76	58.04 pk	74.00 pk	-15.96	100	14
4861.64	46.28 av	35.07	2.13	37.76	45.72 av	54.00 av	-8.28	100	14

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
2051.45	45.83 pk	30.99	2.44	35.18	44.08 pk	54.00 av	-9.92	100	59
2878.12	46.63 pk	31.05	1.43	34.86	44.25 pk	54.00 av	-9.75	103	319
4919.58	58.35 pk	35.29	2.15	37.82	57.97 pk	74.00 pk	-16.03	100	8
4919.58	47.74 av	35.29	2.15	37.82	47.36 av	54.00 av	-6.64	100	8

1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1162.34	52.21 pk	25.25	2.19	34.02	45.63 pk	54.00 av	-8.37	102	101
1844.16	49.61 pk	29.69	2.48	34.87	46.91 pk	54.00 av	-7.09	100	54
2001.5	46.41 pk	31.00	2.60	35.18	44.82 pk	54.00 av	-9.18	100	43
2321.18	48.55 pk	30.94	1.62	35.19	45.92 pk	54.00 av	-8.08	101	144
4919.58	59.50 pk	35.29	2.15	37.82	59.12 pk	74.00 pk	-14.88	100	8
4919.58	45.31 av	35.29	2.15	37.82	44.93 av	54.00 av	-9.07	100	8

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

4.5 Band Edge Measurement

4.5.1 Test Procedure (Conducted)

1. The transmitter output of EUT was connected to the spectrum analyzer.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 100KHz
VBW: 100KHz
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

4.5.2 Test Setup (Conducted)



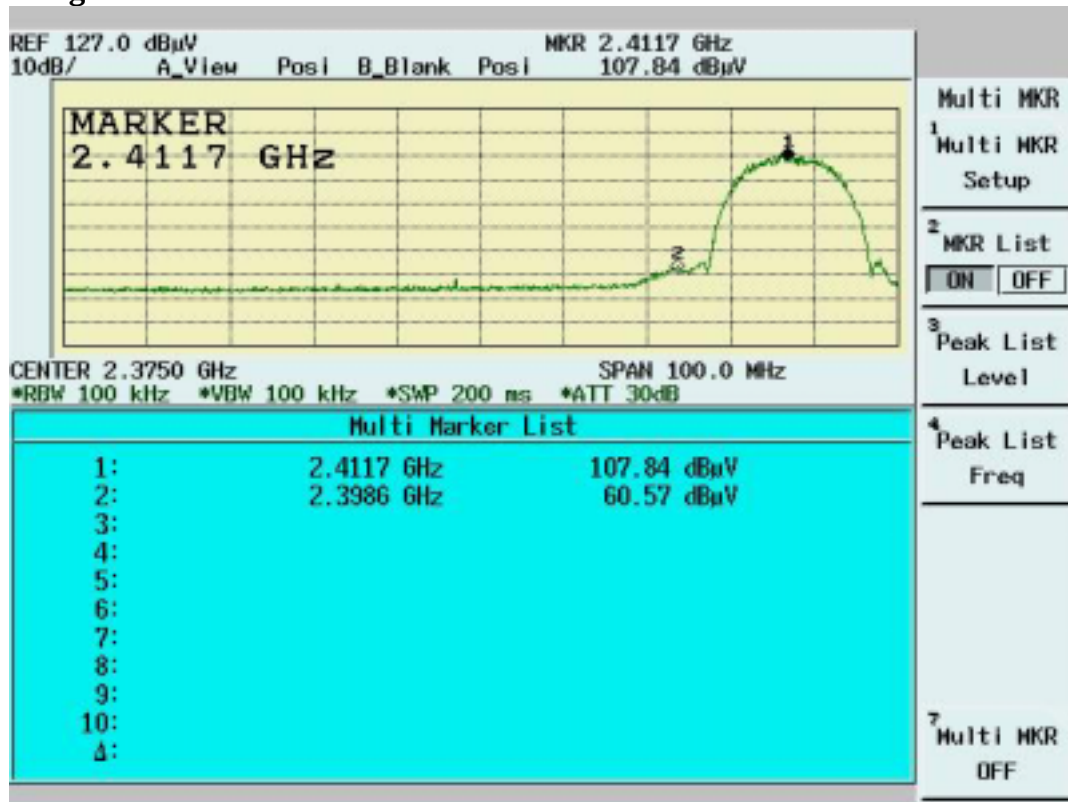
4.5.3 Test Data:

Table: Band Edge measurement (Conducted)

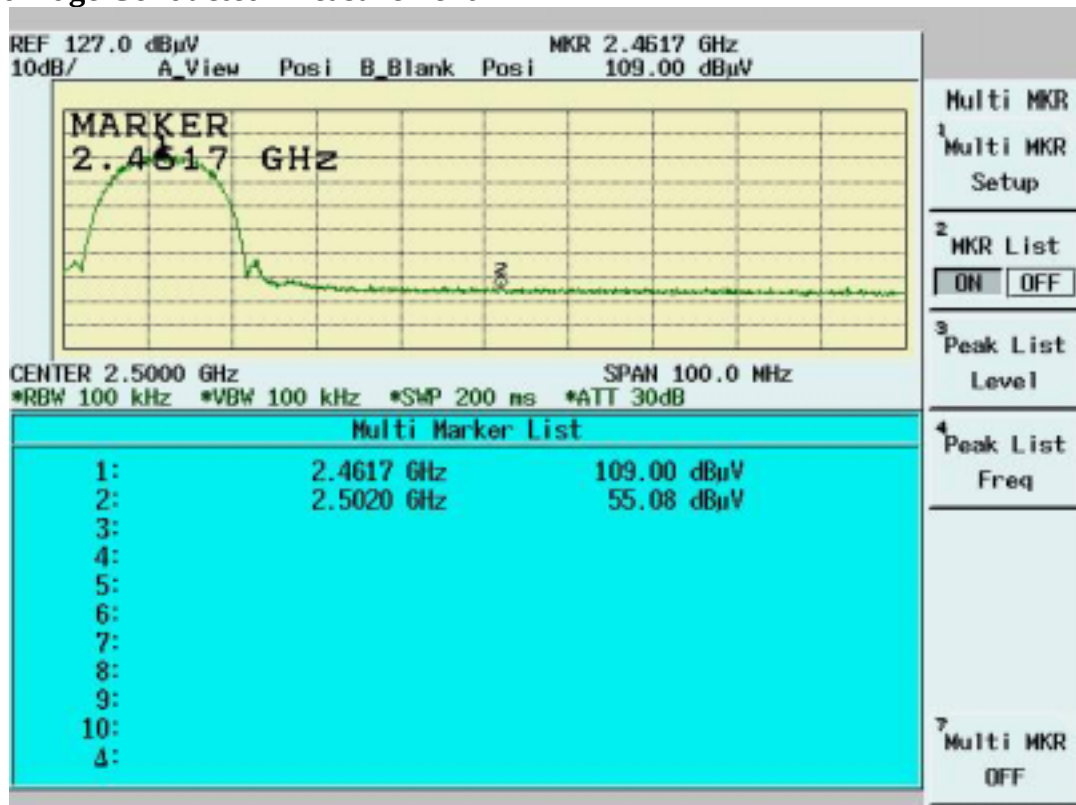
Temp. (deg. C): 25
Humidity (%): 50
Test Engr: Jerry Chiou

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
1	2411.7	107.84	---	---
Outside band	2398.6	60.57	47.27	Pass
11	2461.7	109	---	---
Outside band	2502	55.08	53.92	Pass

Band Edge Conducted measurement



Band Edge Conducted Measurement



4.5.4 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 1MHz
VBW: 3MHz
Center frequency: 2.395GHz, 2.48GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band
Change RBW: 1MHz
VBW: 10Hz
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

4.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

4.5.6 Test Data

Table Band Edge measurement (Radiated)

Temp. (deg. C): 25
Humidity (%): 50

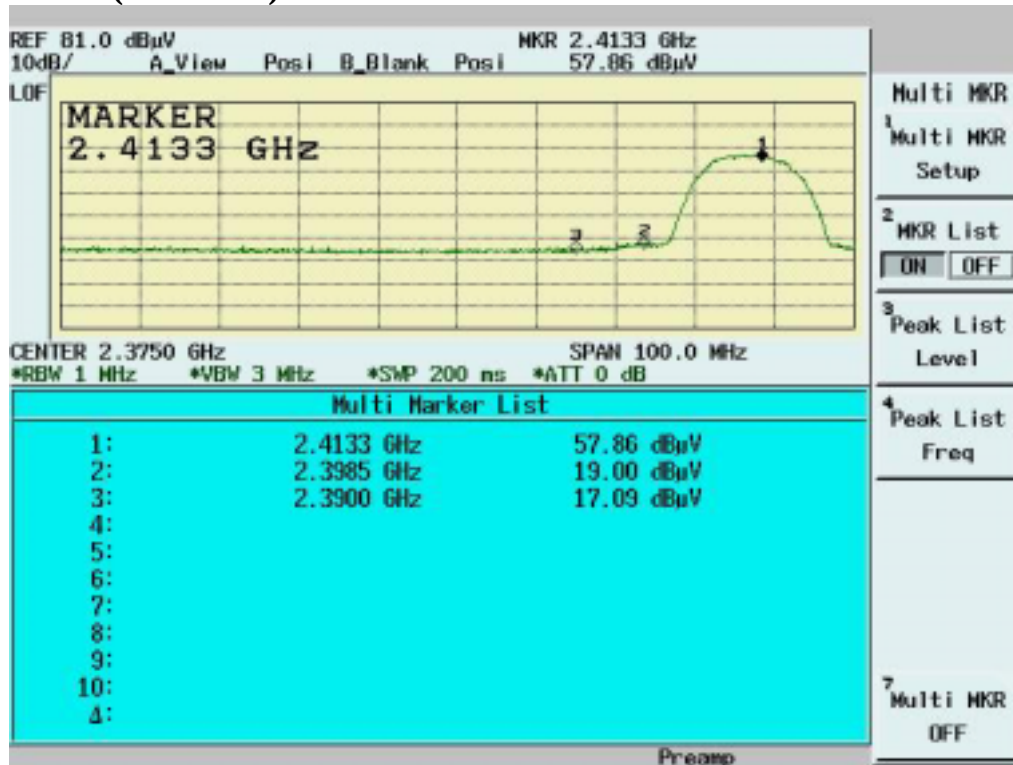
Test Engr: Jerry Chiou

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (average mode)	2411.4	49.26	35.48	84.74	---	---	10Hz	---
Channel_1 (peak mode)	2413.3	57.86	35.48	93.34	---	---	3MHz	---
Outside band (peak mode)	2398.5	19	35.48	54.48	38.86	---	3MHz	Pass
Channel_11 (average mode)	2463.3	46.34	35.5	81.84	---	---	10Hz	---
Channel_11 (peak mode)	2463.2	55.2	35.5	90.7	---	---	3MHz	---
Outside band (peak mode)	2483.5	16.48	35.51	51.99	38.71	---	3MHz	Pass
Channel_1 Restricted band (peak mode)	2390	17.09	35.47	52.56	---	74	3MHz	Pass
Restricted band (average mode)	2326.4	5.38	35.47	40.85	---	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2539.2	17.56	35.51	53.07	---	74	3MHz	Pass
Restricted band (average mode)	2549.1	6.4	35.51	41.91	---	54	10Hz	Pass

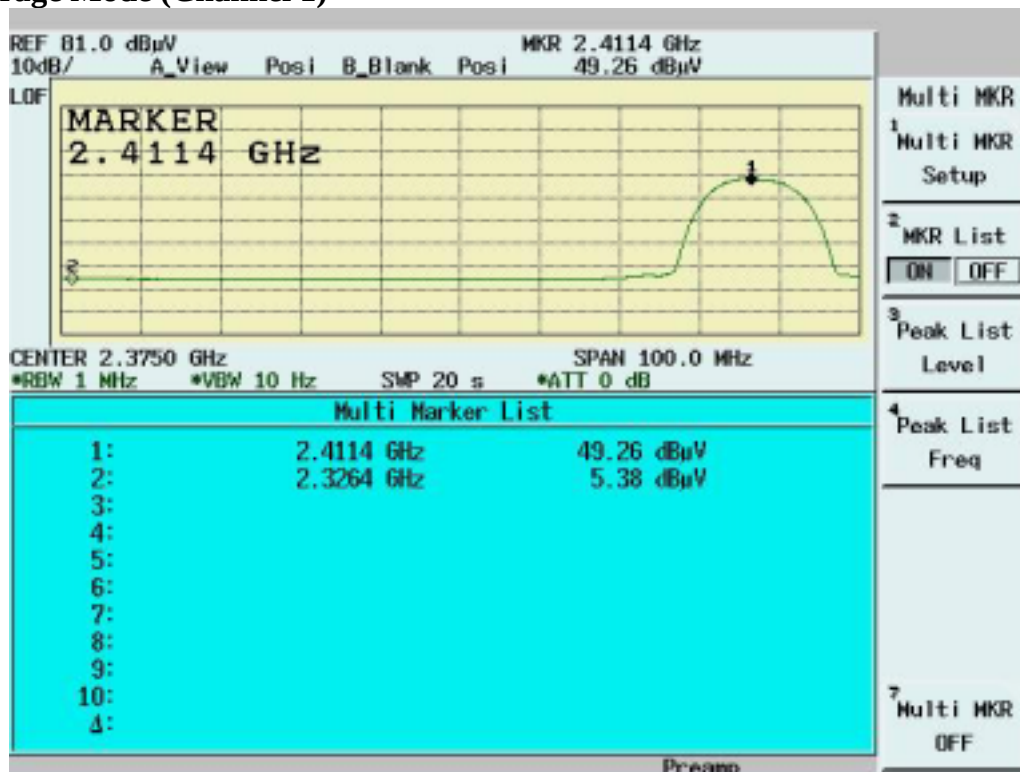
Note:

- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

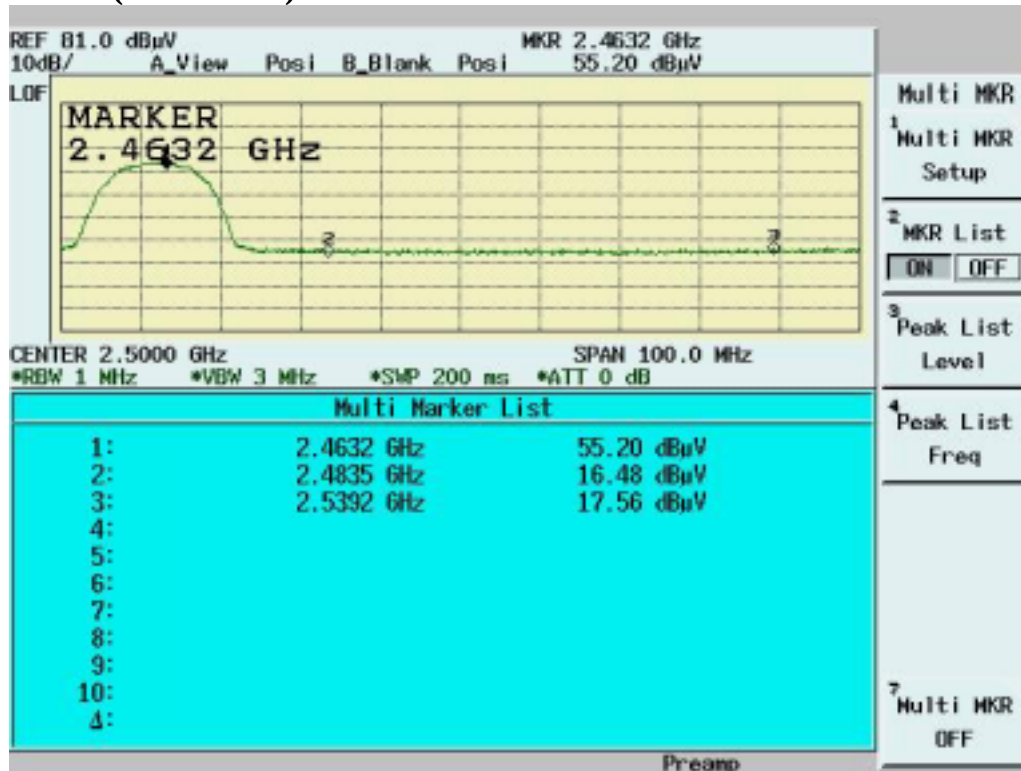
Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 1)



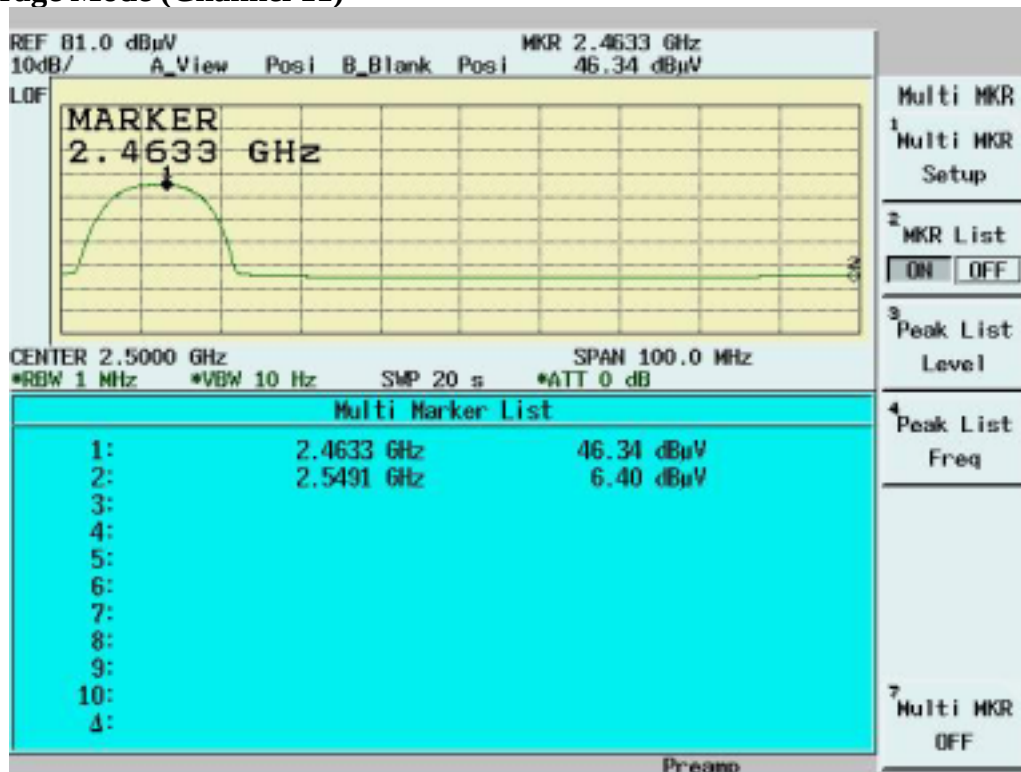
Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 1)



Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 11)



Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 11)



4.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

See MPE report

4.7 DSSS Peak Power Spectral Density [Section 15.247(d)]

4.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN:1.5MHz
RBW: 3KHz
VBW: 30KHz
Center frequency: fundamental frequency tested.
Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

4.7.2 Test Setup



4.7.3 Test Data

Maximum Peak Output Power Density

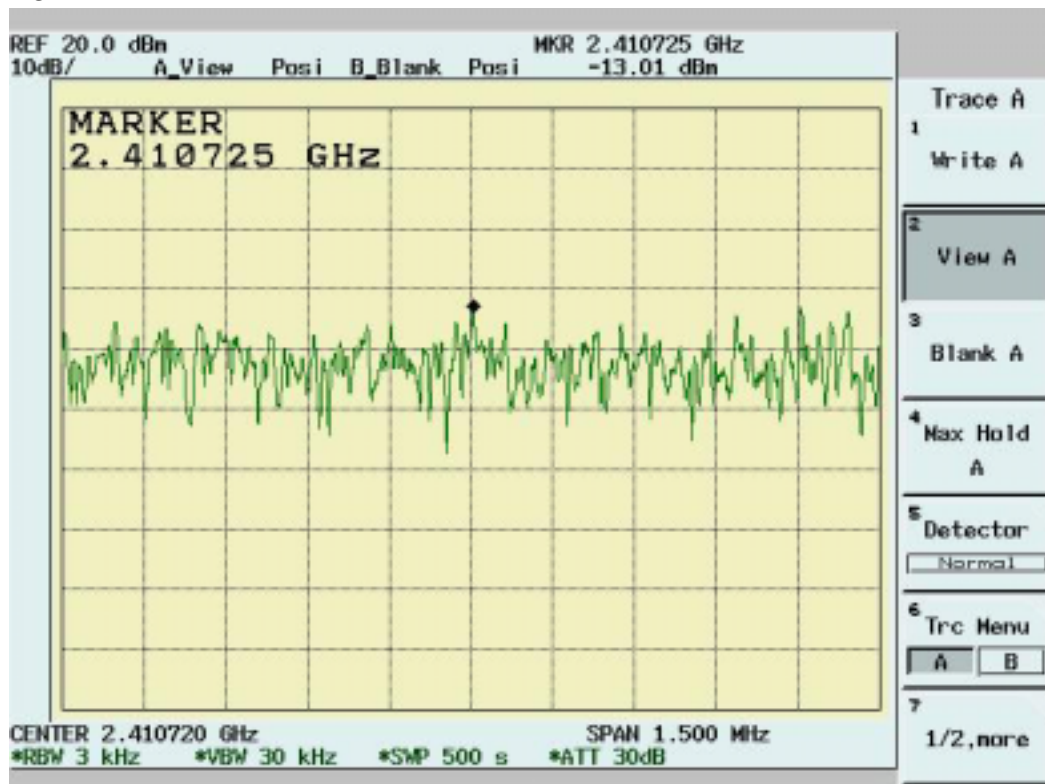
Temp. (deg. C): 25

Test Engr: Jerry Chiou

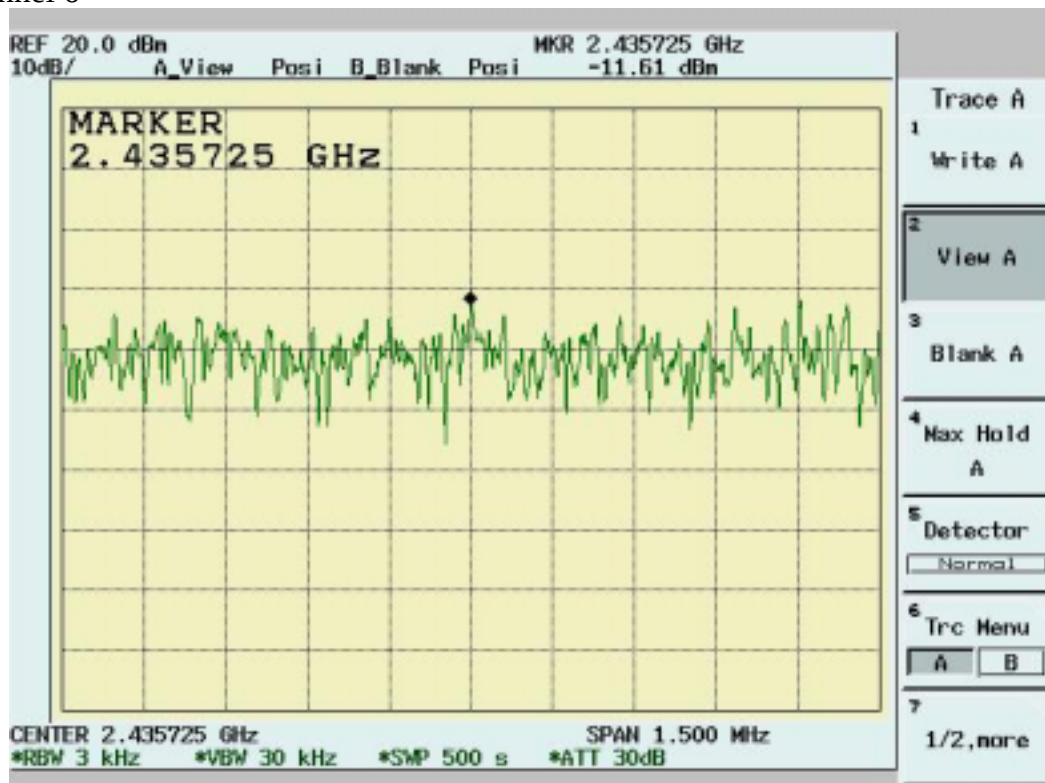
Humidity (%): 50

Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-13.01	1.1	-11.91	8	Pass
6	2437	-11.61	1.1	-10.51	8	Pass
11	2462	-11.68	1.1	-10.58	8	Pass

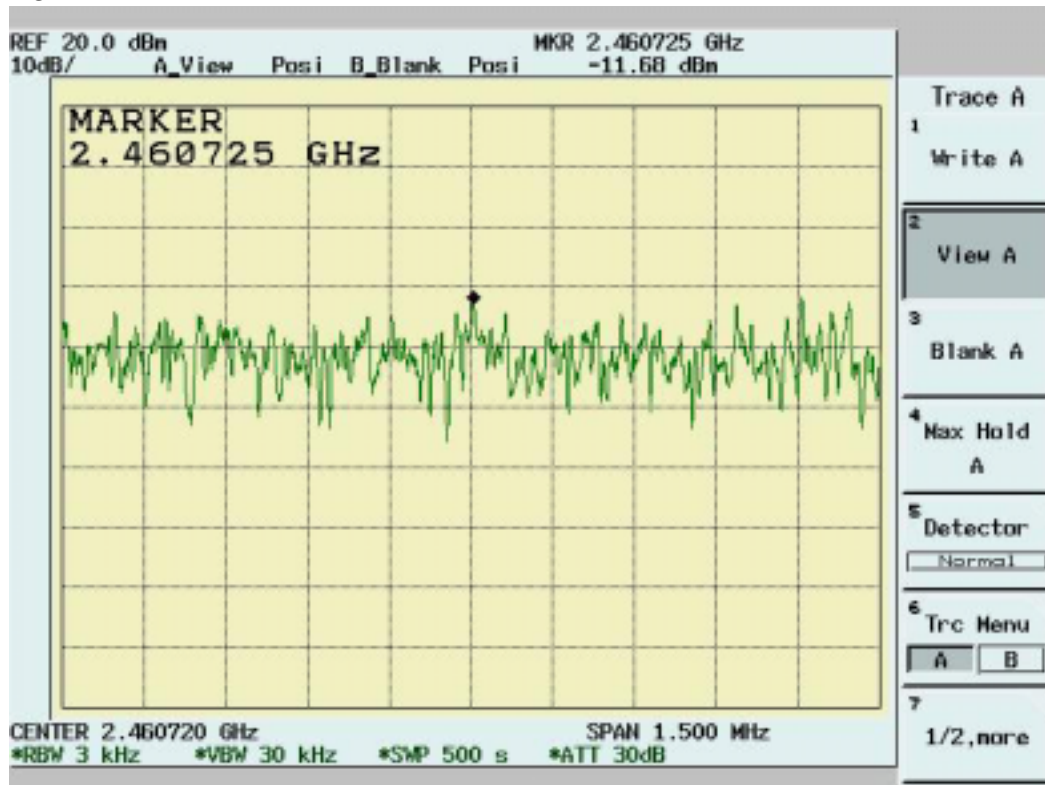
Channel 1



Channel 6



Channel 11



5. TEST RESULTS (802.11g)

5.1 Powerline Conducted Emissions [Section 15.207]

5.1.1 EUT Configuration

The EUT was set up on the non-conductive table that is 1.0 by 1.5 meter, 80cm above ground. The wall of the shielded room was located 40cm to the rear of the EUT.

Power to the EUT was provided through the LISN. The impedance vs. frequency characteristic of the LISN is complied with the limit used.

Both lines (neutral and hot) were connected to the LISN in series at testing. A coaxial-type connector which provides one 50 ohms terminating impedance was provided for connecting the test instrument. The excess length of the power cord was folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

If the EUT is a Personal Computer or a peripheral of personal computer, and the personal computer has an auxiliary AC outlet which can be used for providing power to an external monitor, then all measurements will be made with the monitor power from first the computer-mounted AC outlet and then a floor-mounted AC outlet.

5.1.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. The main power line conducted EMI tests were run on the hot and neutral conductors of the power cord and the results were recorded. The effect of varying the position of the interface cables has been investigated to find the configuration that produces maximum emission.

At the frequencies where the peak values of the emissions were higher than 6dB below the applicable limits, the emissions were also measured with the quasi-peak detectors. At the frequencies where the quasi-peak values of the emissions were higher than 6dB below the applicable average limits, the emissions were also measured with the average detectors.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

5.1.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

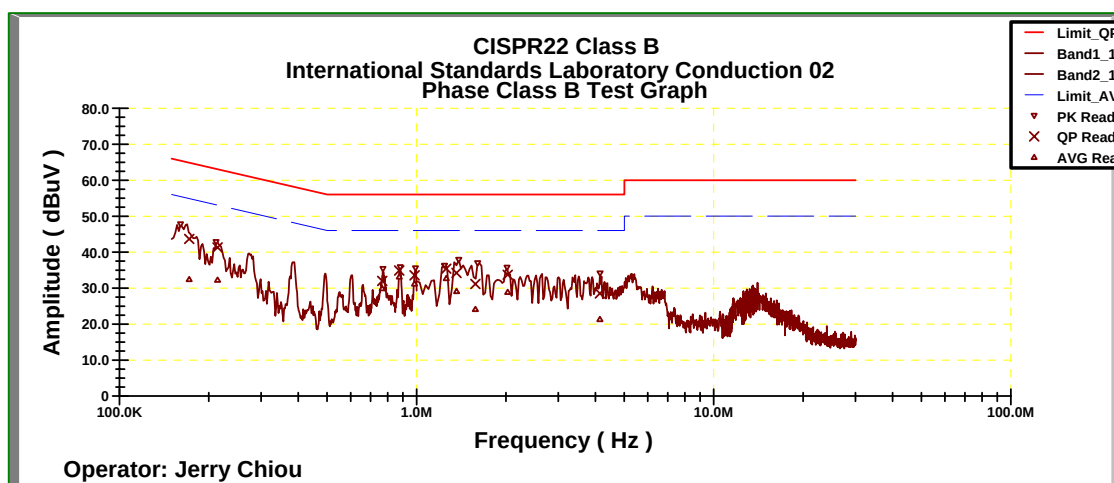
Frequency Range	150 KHz--30MHz
Detector Function	Quasi-Peak/Average
Bandwidth (RBW)	9KHz

5.1.4 Test Data:

Power Line Conducted Emissions (Hot) Channel 1, 6, 11

Operator: Jerry Chiou
Temperature (C): 25
Humidity (%): 56

Frequency	LISN Loss	Cable Loss	QP Corrt.	QP Limit	QP Margin	AVE Corrt.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.17178	0.10	0.03	43.66	65.38	-21.72	32.41	55.38	-22.97
0.21395	0.11	0.05	41.30	64.17	-22.87	32.25	54.17	-21.93
0.76585	0.20	0.07	31.99	56.00	-24.01	29.87	46.00	-16.13
0.87426	0.20	0.07	34.88	56.00	-21.12	33.13	46.00	-12.87
0.98378	0.20	0.07	33.52	56.00	-22.48	31.19	46.00	-14.81
1.25877	0.23	0.08	35.39	56.00	-20.61	32.69	46.00	-13.31
1.36222	0.24	0.08	34.19	56.00	-21.81	29.09	46.00	-16.91
1.57717	0.26	0.08	31.14	56.00	-24.86	24.09	46.00	-21.91
2.02528	0.30	0.09	33.70	56.00	-22.30	28.86	46.00	-17.14
4.13814	0.40	0.14	28.52	56.00	-27.48	21.29	46.00	-24.71



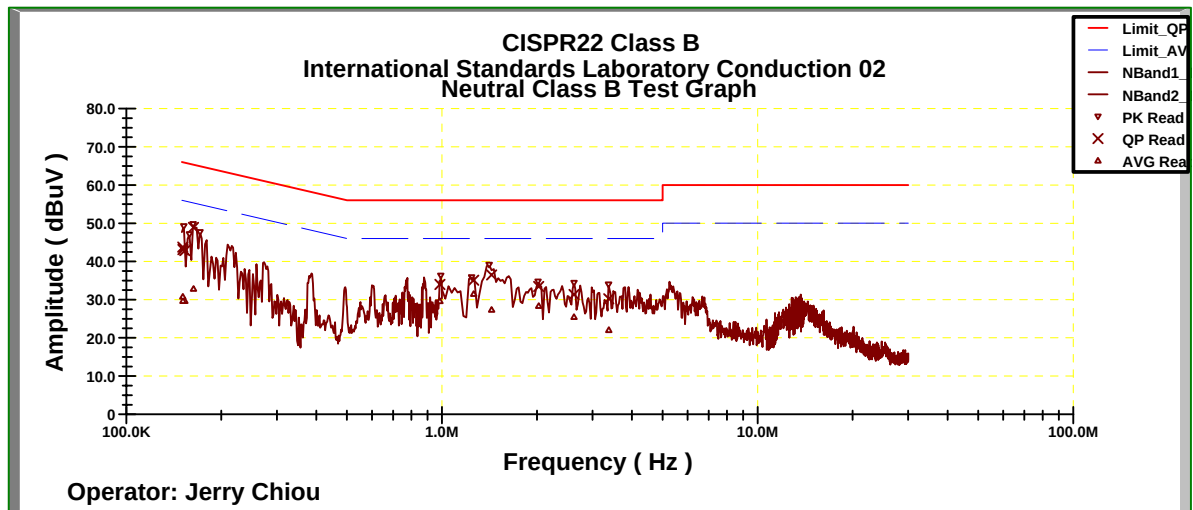
Power Line Conducted Emissions (Neutral) Channel 1, 6, 11

Operator: Jerry Chiou

Temperature (C): 25

Humidity (%): 56

Frequency	LISN Loss	Cable Loss	QP Corrt.	QP Limit	QP Margin	AVE Corrt.	AVE Limit	AVE Margin
MHz	(dB)	(dB)	Amp.(dBuV)	(dBuV)	(dB)	Amp.(dBuV)	(dBuV)	(dB)
0.15099	0.40	0.02	43.74	65.97	-22.23	30.75	55.97	-25.23
0.151182	0.40	0.02	43.08	65.97	-22.89	29.64	55.97	-26.33
0.153356	0.40	0.02	42.81	65.90	-23.09	29.62	55.90	-26.29
0.16334	0.40	0.03	48.88	65.62	-16.74	32.79	55.62	-22.83
0.98498	0.40	0.07	33.95	56.00	-22.05	29.59	46.00	-16.41
1.26004	0.50	0.08	35.09	56.00	-20.91	31.46	46.00	-14.54
1.43566	0.50	0.08	36.46	56.00	-19.54	27.30	46.00	-18.70
2.02423	0.50	0.09	33.43	56.00	-22.57	28.34	46.00	-17.66
2.61924	0.50	0.11	31.35	56.00	-24.65	25.42	46.00	-20.58
3.37584	0.50	0.12	30.22	56.00	-25.78	22.01	46.00	-23.99



* NOTE: During the test, the EMI receiver was set to Max. Hold then switch the EUT Channel between 1, 6, 11 to get the maximum reading of all these channels.

Margin = Amplitude + Insertion Loss- Limit

A margin of -8dB means that the emission is 8dB below the limit

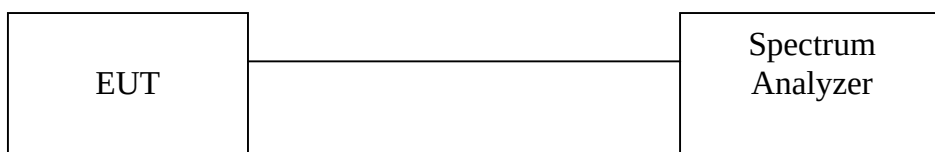
5.2 Bandwidth for DSSS [Section 15.247 (a)(2)]

5.2.1 Test Procedure

The Transmitter output of EUT was connected to the spectrum analyzer. The 6 dB bandwidth of the fundamental frequency was measured. The setting of spectrum analyzer is as follows

Equipment mode	Spectrum analyzer
Detector function	Peak mode
RBW	100KHz
VBW	100KHz

5.2.2 Test Setup



5.2.3 Test Data:

6dB Bandwidth

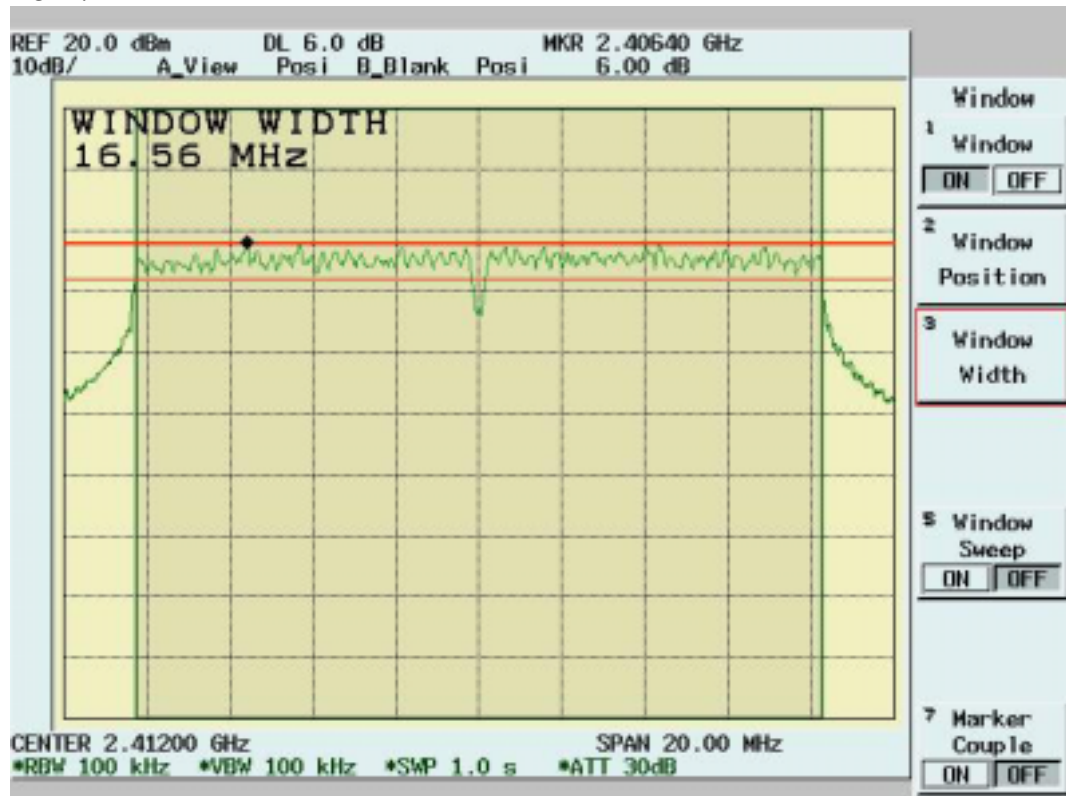
Temp. (deg. C): 25

Test Engr: Jerry Chiou

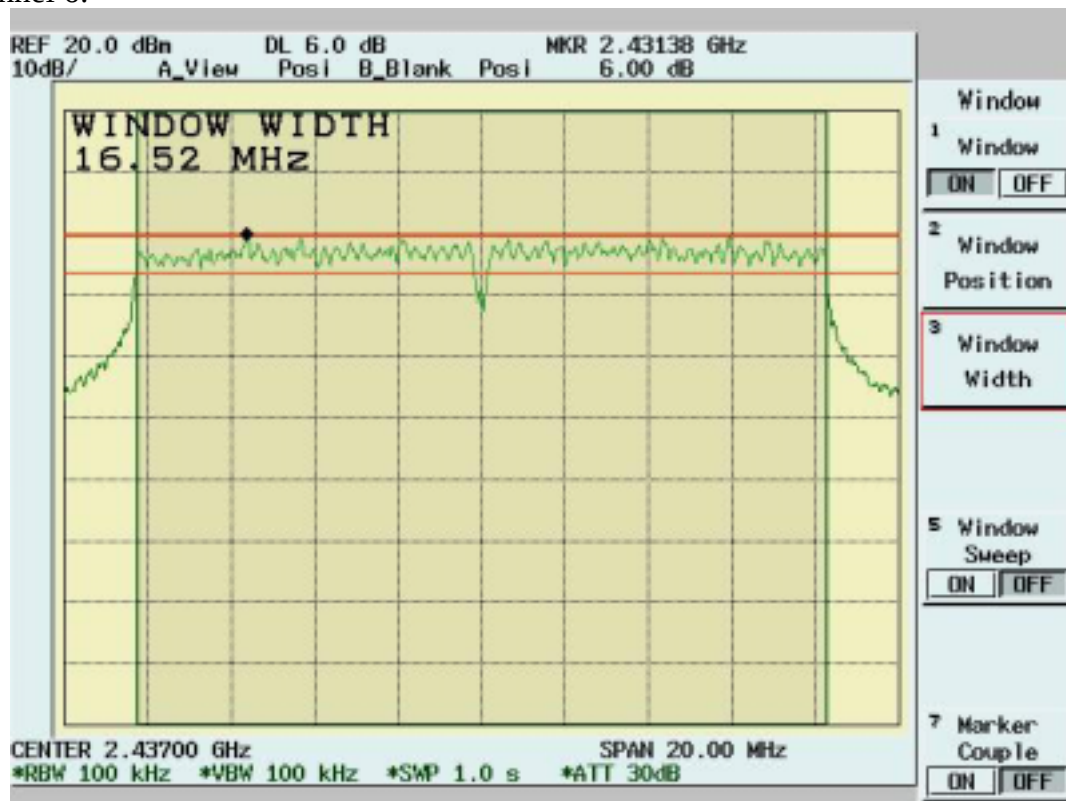
Humidity (%): 50

Chennel	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Pass/Fail
1	2412	16.56	0.5	Pass
6	2437	16.52	0.5	Pass
11	2462	16.52	0.5	Pass

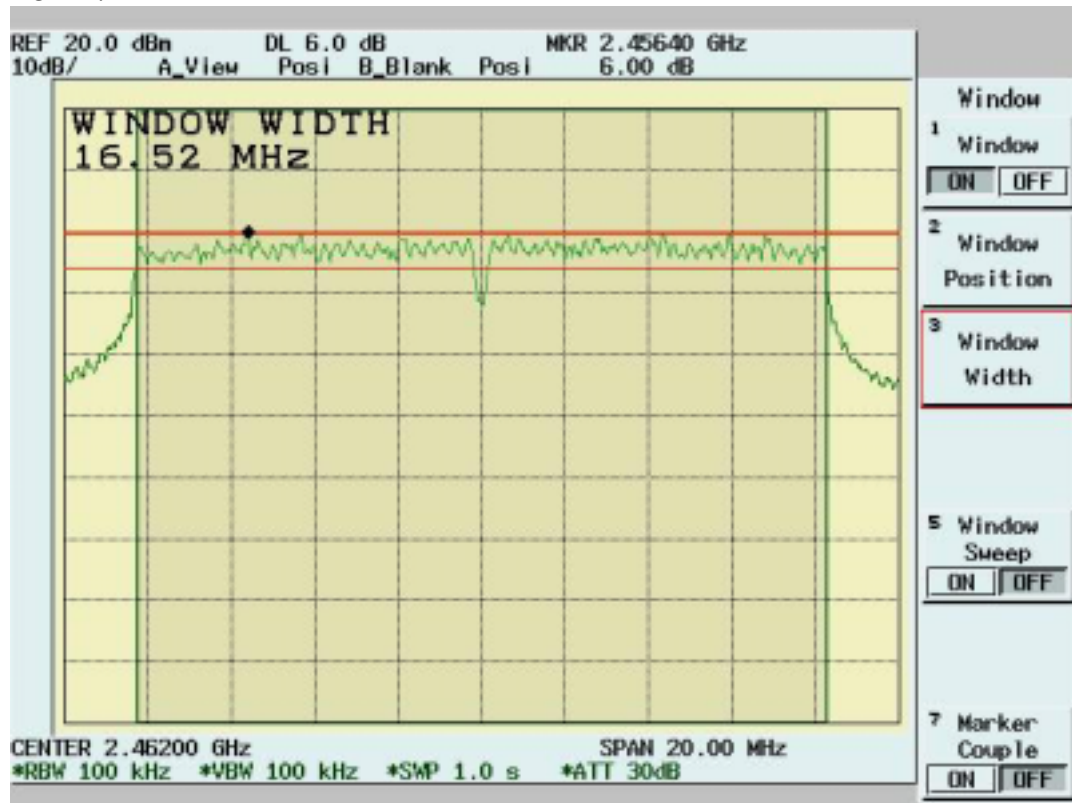
Channel 1:



Channel 6:



Channel 11:

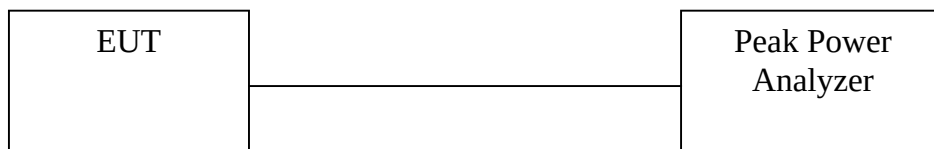


5.3 DSSS Maximum Peak Output Power [Section 15.247 (b)(1)]

5.3.1 Test Procedure

The Transmitter output of EUT was connected to the peak power analyzer.

5.3.2 Test Setup



5.3.3 Test Data

Maximum Peak Output Power

Temp. (deg. C): 25
 Humidity (%): 50
 Test Engr: Jerry Chiou

Channel	Frequency (Mhz)	Analyzer Reading (dBm)	Cable Loss (dB)	Peak Power Output (mW)	Peak Power Output (dBm)	Limit (dBm)	Pass/Fail
1	2412	16.68	1.1	59.98	17.78	30	Pass
6	2437	16.86	1.1	62.52	17.96	30	Pass
11	2462	16.64	1.1	59.43	17.74	30	Pass

5.4 Radiated Emission Measurement [Section [15.247(c)(4)]

5.4.1 EUT Configuration

The equipment under test was set up on the 10 meter chamber with measurement distance of 3 meters. The EUT was placed on a non-conductive table 80cm above ground.

Any changes made to the configuration, or modifications made to the EUT, during testing are noted in the following test record.

5.4.2 Test Procedure

The system was set up as described above, with the EMI diagnostic software running. We found the maximum readings by varying the height of antenna and then rotating the turntable. Both polarization of antenna, horizontal and vertical, are measured.

30M to 1GHz: The highest emissions between 30 MHz to 1000 MHz were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in quasi-peak mode to determine the precise amplitude of the emissions. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission.

1GHz – 25GHz: The highest emissions were also analyzed in details by operating the spectrum analyzer and/or EMI receiver in peak mode to determine the precise amplitude of the emission. While doing so, the interconnecting cables and major parts of the system were moved around, the antenna height was varied between one and four meters, its polarization was varied between vertical and horizontal, and the turntable was slowly rotated, to maximize the emission. During test the EMI receiver and spectrum was setup according to *EMI Receiver/Spectrum Analyzer Configuration*.

For the test of 2nd to 10th harmonics frequencies, the equipment setup was also refer to *EMI Receiver/Spectrum Analyzer Configuration*. The frequencies were tested using Peak mode first, if the test data is higher than the emissions limit, an additional measurement using Average mode will be performed and the average reading will be compared to the limit and record in test report.

5.4.3 EMI Receiver/Spectrum Analyzer Configuration (for the frequencies tested)

Frequency Range Tested:	30MHz~1000MHz
Detector Function:	Quasi-Peak Mode
Resolution Bandwidth (RBW):	120KHz
Video Bandwidth (VBW)	1MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Peak Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	3MHz
Frequency Range Tested:	1GHz – 25 GHz
Detector Function:	Average Mode
Resolution Bandwidth (RBW):	1MHz
Video Bandwidth (VBW)	10 Hz

5.4.4 Test Data (30MHz – 1GHz):

30M – 1GHz Open Field Radiated Emissions (Horizontal) Channel 1, 6, 11

Operator: Jerry Chiou
Temperature (C): 23
Humidity (%): 54

Frequency	Rx Amp.	Ant Fact	CableLoss	PreAmpGain	Corrct. Emi.	Limit	Margin	Ant. Pos.	Table Pos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
159.98	16.14	8.70	2.35	0.00	27.19	43.50	-16.31	196.00	353.00
183.26	13.80	8.53	2.62	0.00	24.95	43.50	-18.55	196.00	320.00
195.87	13.28	8.78	2.67	0.00	24.72	43.50	-18.78	196.00	336.00
199.75	15.19	8.89	2.70	0.00	26.78	43.50	-16.72	196.00	336.00
239.52	26.12	10.14	3.03	0.00	39.30	46.00	-6.70	196.00	336.00
320.03	14.41	16.02	3.83	0.00	34.26	46.00	-11.74	103.00	56.00
352.04	7.12	16.19	4.12	0.00	27.44	46.00	-18.56	103.00	90.00
404.42	7.19	15.93	4.47	0.00	27.58	46.00	-18.42	196.00	353.00
499.48	3.64	17.39	5.28	0.00	26.31	46.00	-19.69	103.00	123.00
639.16	1.30	18.93	6.23	0.00	26.47	46.00	-19.53	103.00	320.00
664.38	2.08	19.00	6.40	0.00	27.47	46.00	-18.53	103.00	352.00
827.34	1.09	20.37	7.70	0.00	29.15	46.00	-16.85	196.00	21.00

30M – 1GHz Open Field Radiated Emissions (Vertical) Channel 1, 6, 11

Operator: Jerry Chiou
Temperature (C): 23
Humidity (%): 54

Frequency	Rx Amp.	Ant Fact	CableLoss	PreAmpGain	Corrct. Emi.	Limit	Margin	Ant. Pos.	Table Pos.
MHz	(dBuV)	(dB/m)	(dB)	(dB)	(dBuV/m)	(dBuV/m)	(dB)	(cm)	(deg)
57.16	13.98	6.00	1.31	0.00	21.28	40.00	-18.72	196.00	254.00
95.96	15.95	9.49	1.91	0.00	27.34	43.50	-16.16	103.00	336.00
159.98	16.05	8.70	2.35	0.00	27.11	43.50	-16.39	196.00	353.00
180.35	14.01	8.50	2.59	0.00	25.10	43.50	-18.40	196.00	353.00
239.52	23.16	10.14	3.03	0.00	36.33	46.00	-9.67	196.00	336.00
320.03	8.98	16.02	3.83	0.00	28.82	46.00	-17.18	103.00	56.00
359.8	8.05	16.14	4.17	0.00	28.37	46.00	-17.63	196.00	53.00
499.48	5.23	17.39	5.28	0.00	27.91	46.00	-18.09	103.00	123.00
539.25	4.45	18.34	5.45	0.00	28.24	46.00	-17.76	103.00	106.00
666.32	3.45	19.00	6.41	0.00	28.86	46.00	-17.14	103.00	352.00
731.31	0.94	19.75	6.88	0.00	27.57	46.00	-18.43	103.00	172.00
764.29	1.61	20.17	7.06	0.00	28.85	46.00	-17.15	196.00	254.00

NOTE:

- During the Pre-test, the EUT has been tested for Channel 1, 6, 11 transmit from Main and Aux antenna respectively to get all the critical emission frequencies. In the final test all the critical emission frequencies has been tested and the test data are listed above.
- Margin = Corrected Amplitude – Limit
Corrected Amplitude = Radiated Amplitude + Antenna Correction Factor + Cable Loss - Pre-Amplifier Gain
A margin of -8dB means that the emission is 8dB below the limit

All frequencies from 30MHz to 1GHz have been tested

International Standards Laboratory

Report Number: 06LR017FC

HC LAB: NVLAP:200234-0; VCCI: R-341,C-354; NEMKO: ELA 113A; BSMI: SL2-IN-E-0037; SL2-R1-E-0037; CNLA: 1178; IC: IC4067
LT LAB: NVLAP:200234-0; VCCI: R-1435,C-1440; NEMKO: ELA 113B; CNLA: 0997; IC: IC4164-1

5.4.5 Test Data (1GHz – 25 GHz) .

1GHz~ 25 GHz (Horizontal), Channel 1: 2412 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1984.02	45.97 pk	30.87	2.59	35.15	44.27 pk	54.00 av	-9.73	100	44
2878.12	46.85 pk	31.05	1.43	34.86	44.47 pk	54.00 av	-9.53	103	319
4818.18	62.59 pk	34.91	2.12	37.71	61.91 pk	74.00 pk	-12.09	100	18
4818.18	50.92 av	34.91	2.12	37.71	50.24 av	54.00 av	-3.76	100	18

1GHz~ 25 GHz (Vertical), Channel 1: 2412 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1162.34	53.55 pk	25.25	2.19	34.02	46.97 pk	54.00 av	-7.03	102	101
1839.16	47.17 pk	29.65	2.48	34.86	44.44 pk	54.00 av	-9.56	100	54
2316.18	50.66 pk	30.94	1.64	35.19	48.04 pk	54.00 av	-5.96	101	142
2510.99	48.38 pk	30.90	1.36	35.19	45.46 pk	54.00 av	-8.54	102	203
4818.18	58.18 pk	34.91	2.12	37.71	57.50 pk	74.00 pk	-16.50	100	18
4818.18	45.98 av	34.91	2.12	37.71	45.30 av	54.00 av	-8.70	100	18

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal) , Channel 6 : 2437 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1492.01	50.25 pk	26.76	2.23	34.20	45.05 pk	54.00 av	-8.95	101	78
4876.12	60.65 pk	35.13	2.14	37.77	60.14 pk	74.00 pk	-13.86	100	12
4876.12	49.90 av	35.13	2.14	37.77	49.40 av	54.00 av	-4.60	100	12

1GHz~ 25 GHz (Vertical), Channel 6 : 2437 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1162.34	51.39 pk	25.25	2.19	34.02	44.81 pk	54.00 av	-9.19	102	101
1332.17	50.40 pk	26.03	2.21	34.11	44.53 pk	54.00 av	-9.47	101	89
2301.2	48.84 pk	30.94	1.68	35.19	46.26 pk	54.00 av	-7.74	101	138
4861.64	55.97 pk	35.07	2.13	37.76	55.42 pk	74.00 pk	-18.58	100	14
4861.64	46.04 av	35.07	2.13	37.76	45.48 av	54.00 av	-8.52	100	14

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “**”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

1GHz~ 25 GHz (Horizontal), Channel 11: 2462 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1159.84	52.12 pk	25.24	2.19	34.02	45.53 pk	54.00 av	-8.47	102	101
2041.46	46.43 pk	30.99	2.47	35.18	44.71 pk	54.00 av	-9.29	100	56
4919.58	58.43 pk	35.29	2.15	37.82	58.05 pk	74.00 pk	-15.95	100	8
4919.58	47.36 av	35.29	2.15	37.82	46.98 av	54.00 av	-7.02	100	8

1GHz~ 25 GHz (Vertical), Channel 11 : 2462 MHz

Operator: Jerry Chiou

RBW: 1MHz
Humidity (%): 32
Temperature (C): 25

Frequency	Rx_R.	Ant_F.	Cab_L.	PreAmpl	Emission	Limit	Margin	A.Tower	T.Table
MHz	dBuV	dB/m	dB	dB	dBuV/m	dBuV/m	dB	cm	deg
1159.84	51.45 pk	25.24	2.19	34.02	44.85 pk	54.00 av	-9.15	102	101
1841.66	47.64 pk	29.67	2.48	34.87	44.92 pk	54.00 av	-9.08	100	54
2296.2	49.30 pk	30.94	1.70	35.19	46.74 pk	54.00 av	-7.26	101	136
4905.09	54.91 pk	35.24	2.15	37.81	54.49 pk	74.00 pk	-19.51	100	9
4905.09	42.64 av	35.24	2.15	37.81	42.22 av	54.00 av	-11.78	100	9

Note:

- According to the standards used, Where limits are specified by agencies for both average and peak (or quasi-peak) detection , if the peak (or quasi-peak) measured value complies with the average limit , it is unnecessary to perform an average measurement.
- “ * ”: Fundamental Frequency
- “***”: Not in the restricted band, Limit level=Fundamental Emission-20dB
- “ pk”: peak mode
- “av”: average mode
- “---”: No meter reading data due to the emission level is smaller than spectrum noise level.
- The Spectrum noise level+Correction Factor < Limit - 6 dB
- Margin=Corrected Amplitude – Limit
- Corrected Amplitude=Radiated Amplitude+Antenna Correction Factor+Cable Loss-Pre-Amplifier Gain
- A margin of -8dB means that the emission is 8dB below the limit.

All frequencies from 1GHz to 25 GHz have been tested.

5.5 Band Edge Measurement

5.5.1 Test Procedure (Conducted)

1. The transmitter output of EUT was connected to the spectrum analyzer.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 100KHz
VBW: 100KHz
Center frequency: 2.4GHz, 2.4835GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed
3. Find the next peak frequency outside the operation frequency band

5.5.2 Test Setup (Conducted)



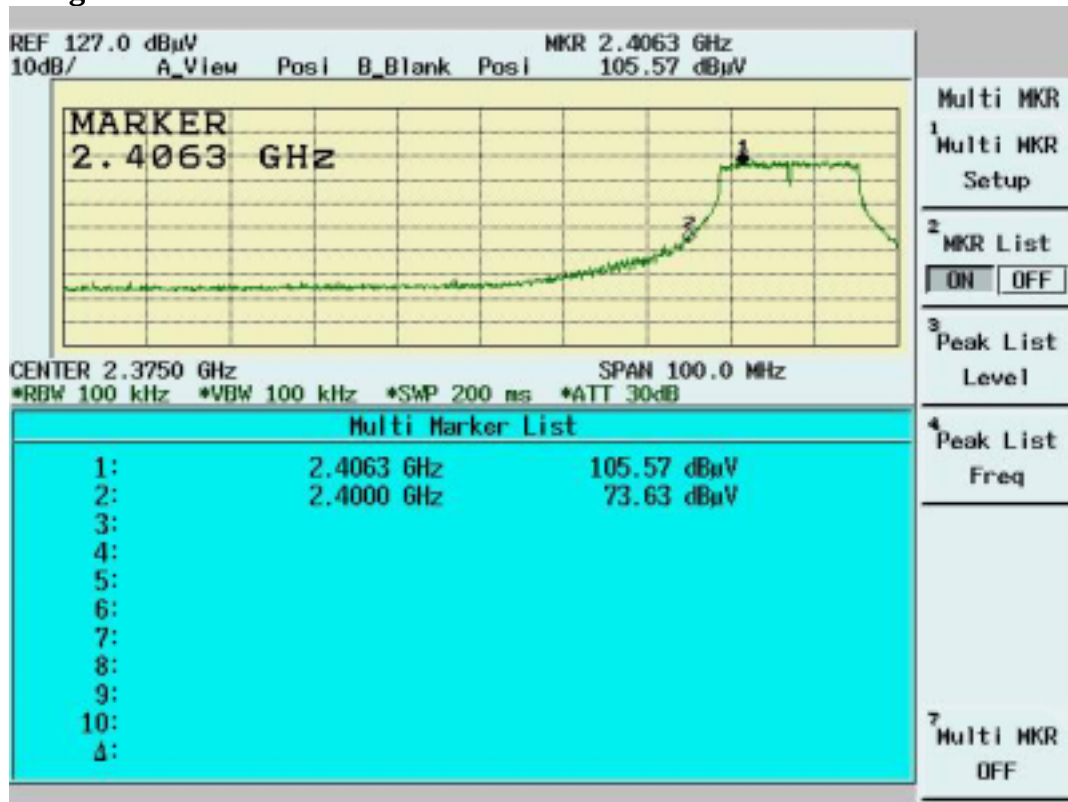
5.5.3 Test Data:

Table: Band Edge measurement (Conducted)

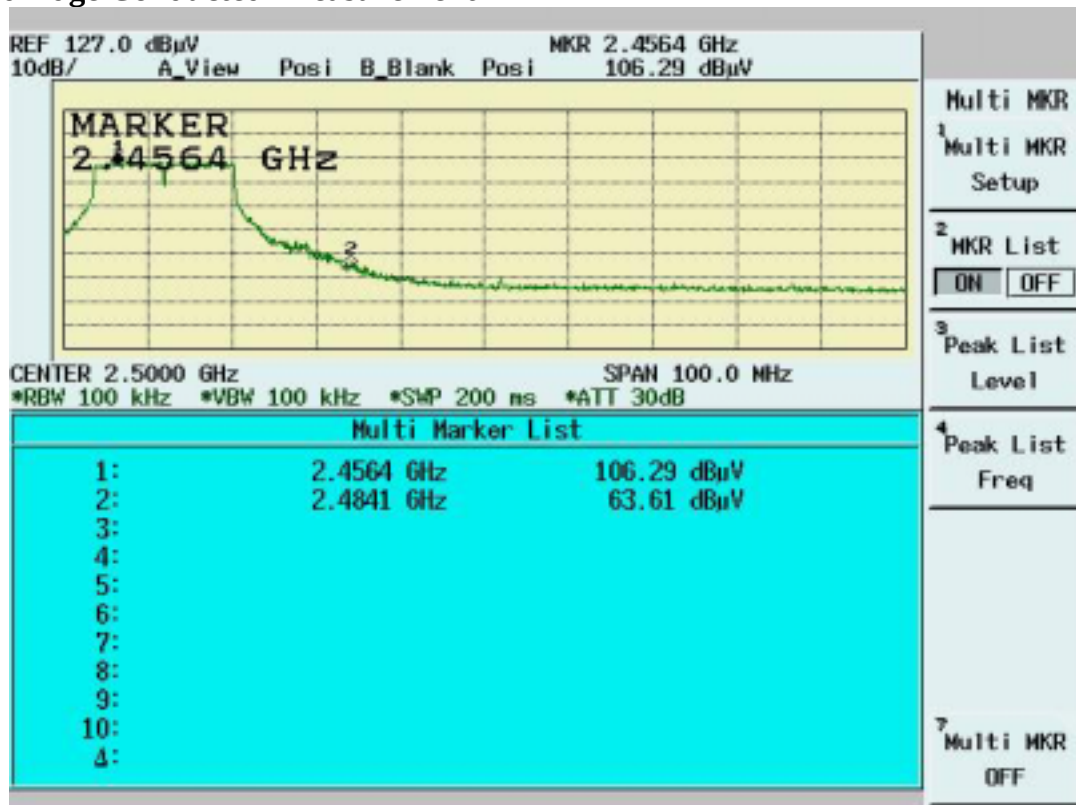
Temp. (deg. C): 25
Humidity (%): 50
Test Engr: Jerry Chiou

Channel	Frequency (MHz)	Spectrum Reading (dBuV)	Carrier - Outsideband Limit: >20dB (dB)	Pass/Fail
1	2406.3	105.57	---	---
Outside band	2400	73.63	31.94	Pass
11	2456.4	106.29	---	---
Outside band	2484.1	63.61	42.68	Pass

Band Edge Conducted measurement



Band Edge Conducted Measurement



5.5.4 Test Procedure (Radiated)

1. Antenna and Turntable test procedure same as Radiated Emission Measurement.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN: 100MHz
RBW: 1MHz
VBW: 3MHz
Center frequency: 2.395GHz, 2.48GHz.
2. Using Peak Search to read the peak power of Carrier frequencies after Maximum Hold function is completed.
3. Find the next peak frequency outside the operation frequency band
4. For peak frequency emission level measurement in Restricted Band ,
Change RBW: 1MHz
VBW: 10Hz
Span: 100MHz.
5. Get the spectrum reading after Maximum Hold function is completed.

5.5.5 Test Setup (Radiated)

Same as *Radiated Emission Measurement*

5.5.6 Test Data

Table Band Edge measurement (Radiated)

Temp. (deg. C): 25
Humidity (%): 50

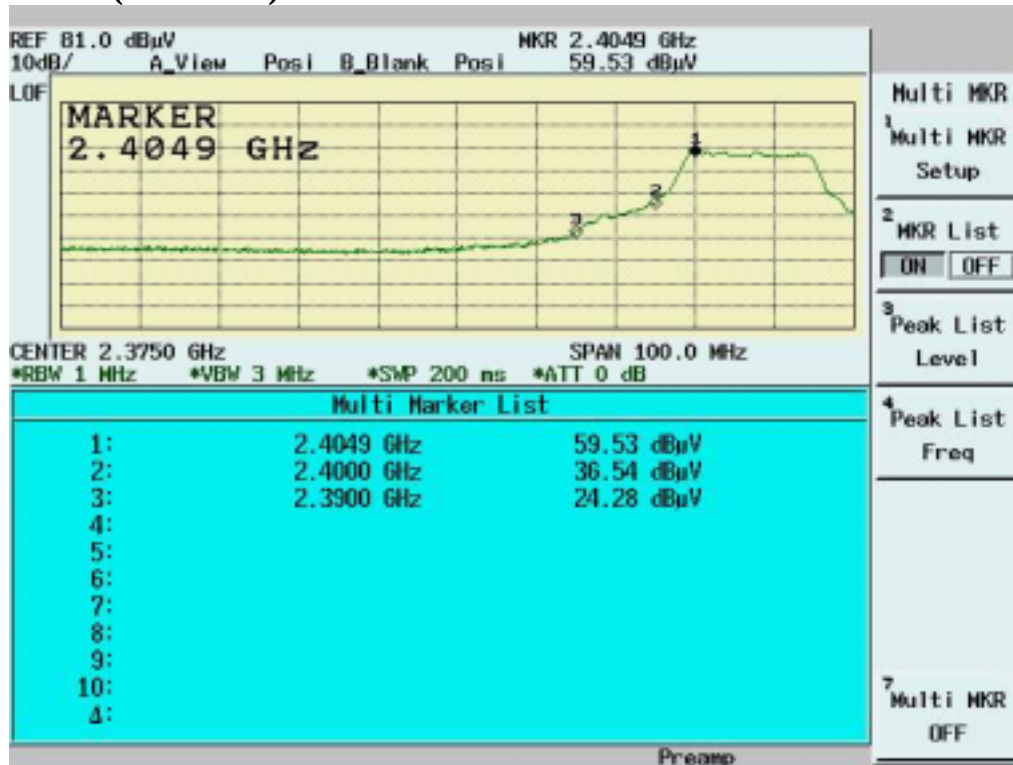
Test Engr: Jerry Chiou

Description	Frequency (MHz)	Spectrum Reading (dBuV)	Correction Factor (dB/m)	Emission Level (dBuV/m)	dBc (Limit: > 20dBc)	Limit (dBuV/m)	Equip. Setup VBW	Pass or Fail
Channel_1 (average mode)	2406.5	47.91	35.48	83.39	---	---	10Hz	---
Channel_1 (peak mode)	2404.9	59.53	35.48	95.01	---	---	3MHz	---
Outside band (peak mode)	2400	36.54	35.48	72.02	22.99	---	3MHz	Pass
Channel_11 (average mode)	2468.2	44	35.5	79.5	---	---	10Hz	---
Channel_11 (peak mode)	2465	55.7	35.5	91.2	---	---	3MHz	---
Outside band (peak mode)	2483.5	20.88	35.51	56.39	34.81	---	3MHz	Pass
Channel_1 Restricted band (peak mode)	2390	24.28	35.47	59.75	---	74	3MHz	Pass
Restricted band (average mode)	2390	8.32	35.47	43.79	---	54	10Hz	Pass
Channel_11 Restricted band (peak mode)	2483.8	21.53	35.51	57.04	---	74	3MHz	Pass
Restricted band (average mode)	2483.5	7.62	35.51	43.13	---	54	10Hz	Pass

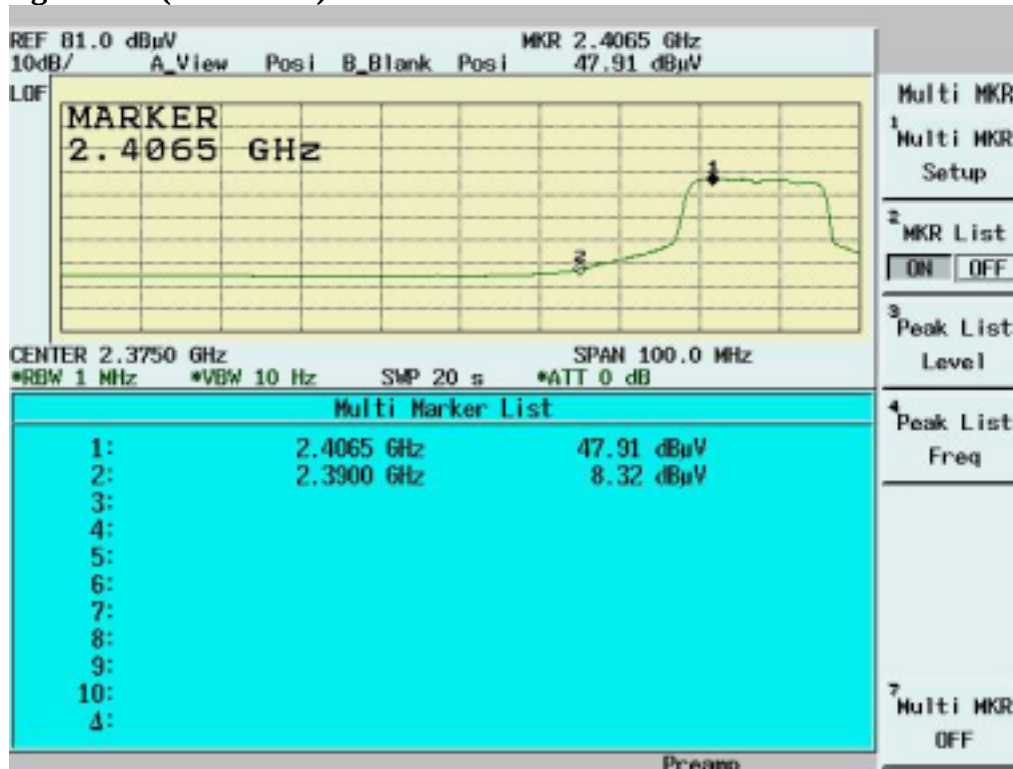
Note:

- The Spectrum plot of emission level measurement in Restricted band is attached.
- Emission Level=Spectrum Reading+Correction Factor
- Correction Factor=Antenna Factor+cable loss–amplifier gain
- Both Horizontal and Vertical polarizaion have been tested and the worst data is listed above.

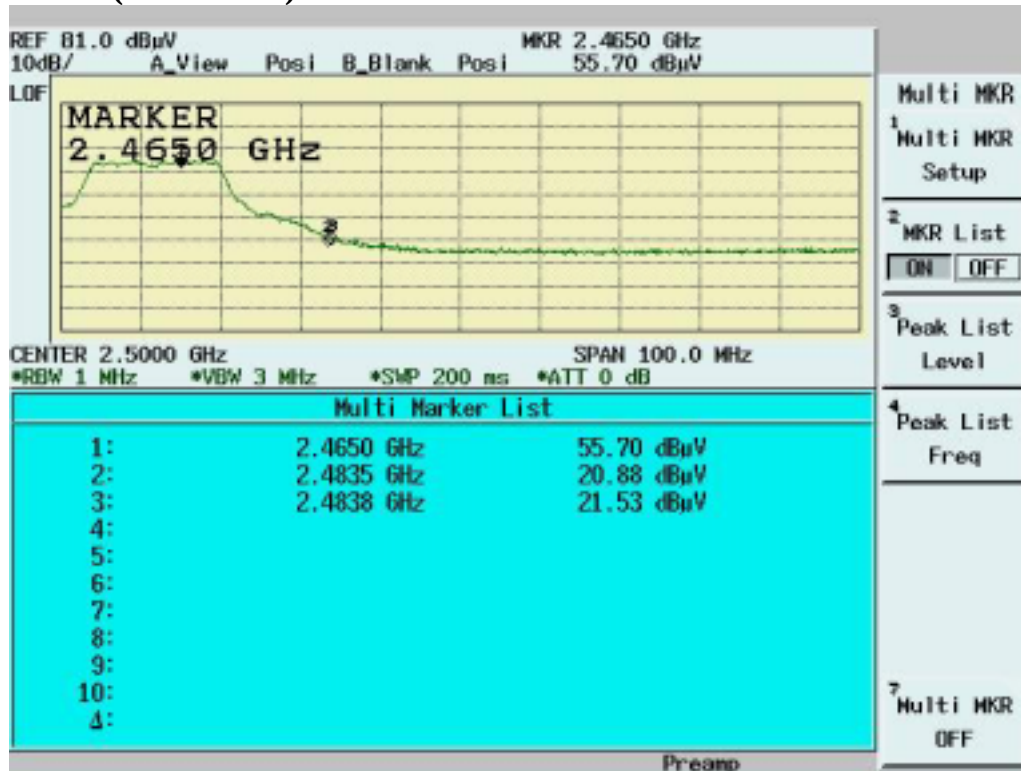
Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 1)



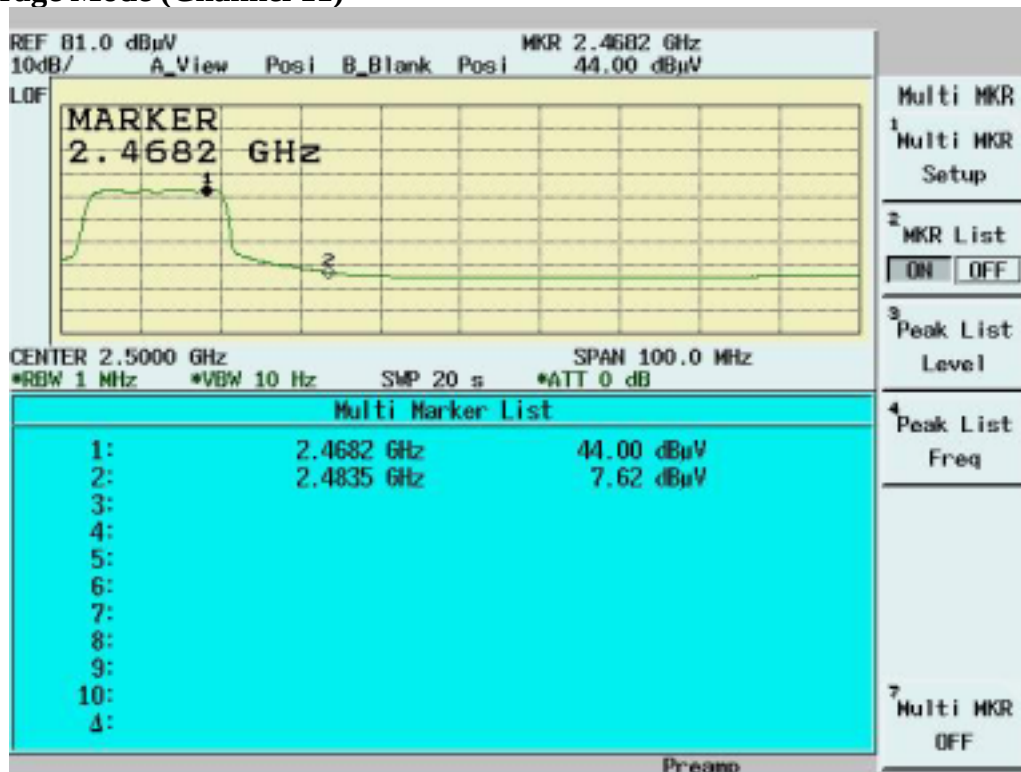
Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 1)



Band Edge measurement for radiated emission in Restricted Band(Radiated) Peak Mode (Channel 11)



Band Edge measurement for radiated emission in Restricted Band(Radiated) Average Mode (Channel 11)



5.6 RF Exposure Measurement [Section 15.247(b)(4) & 1.1307(b)]

See MPE report

5.7 DSSS Peak Power Spectral Density [Section 15.247(d)]

5.7.1 Test Procedure

1. The Transmitter output of EUT was connected to the spectrum analyzer.
Equipment mode: Spectrum analyzer
Detector function: Peak mode
SPAN:1.5MHz
RBW: 3KHz
VBW: 30KHz
Center frequency: fundamental frequency tested.
Sweep time= 500 sec.
2. Using Peak Search to read the peak power after Maximum Hold function is completed.

5.7.2 Test Setup



5.7.3 Test Data

Maximum Peak Output Power Density

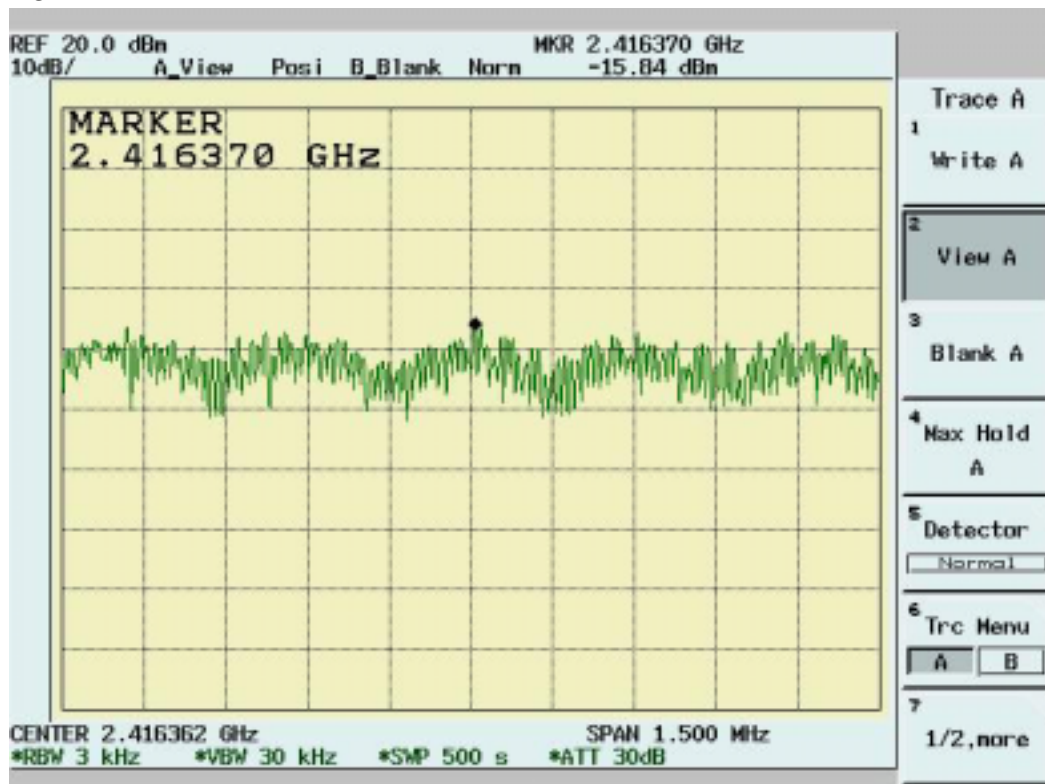
Temp. (deg. C): 25

Test Engr: Jerry Chiou

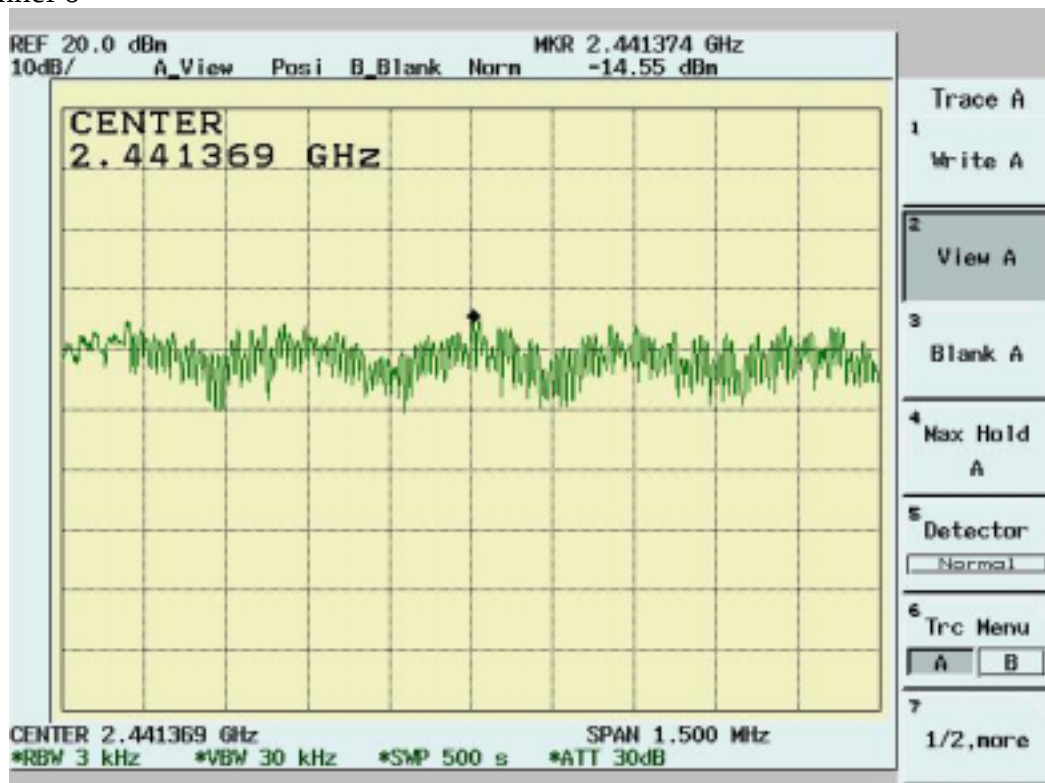
Humidity (%): 50

Chennel	Frequency (MHz)	Spectrum Reading (dBm/3KHz)	Cable Loss (dB)	Peak Power Output (dBm/3KHz)	Limit (dBm/3KHz)	Pass/Fail
1	2412	-15.84	1.1	-14.74	8	Pass
6	2437	-14.55	1.1	-13.45	8	Pass
11	2462	-14.27	1.1	-13.17	8	Pass

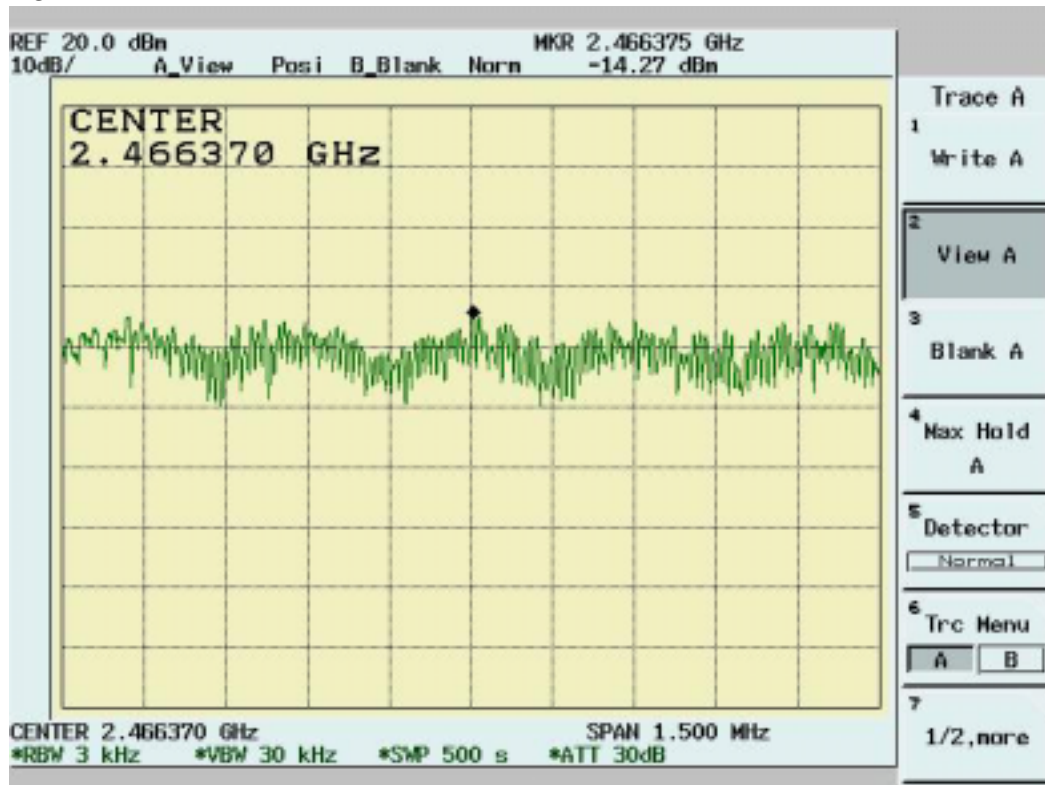
Channel 1



Channel 6



Channel 11



6. Appendix

6.1 Appendix A: Measurement Procedure for Power line Conducted Emissions

The measurements are performed in a 3.5m x 3.4m x 2.5m shielded room, which referred as Conduction 01 test site, or a 3m x 3m x 2.3m test site, which referred as Conduction 02 test site. The EUT was placed on non-conduction 1.0m x 1.5m table, which is 0.8 meters above an earth-grounded.

Power to the EUT was provided through the LISN which has the Impedance (50ohm/50uH) vs. Frequency Characteristic in accordance with the required standard. Power to the LISNs were filtered to eliminate ambient signal interference and these filters were bonded to the ground plane. Peripheral equipment required to provide a functional system (support equipment) for EUT testing was powered from the second LISN through a ganged, metal power outlet box which is bonded to the ground plane at the LISN.

If the EUT is supplied with a flexible power cord, the power cord length in excess of the distance separating the EUT from the LISN shall be folded back and forth at the center of the lead so as to form a bundle not exceeding 40cm in length. If the EUT is provided with a permanently coiled power cord, bundling of the cord is not required. If the EUT is supplied without a power cord, the EUT shall be connected to the LISN by a power cord of the type specified by the manufacturer which shall not be longer than 1 meter. The excess power cord shall be bundled as described above. If a non-flexible power cord is provided with the EUT, it shall be cut to the length necessary to attach the EUT to the LISN and shall not be bundled.

The interconnecting cables were arranged and moved to get the maximum emission. Both the line of power cord, hot and neutral, were measured.

The highest emissions were analyzed in details by operating the spectrum analyzer in fixed tuned mode to determine the nature of the emissions and to provide information which could be useful in reducing their amplitude.

6.2 Appendix B: Test Procedure for Radiated Emissions

Preliminary Measurements in the Anechoic Chamber

The radiated emissions are initially measured in the anechoic chamber at a measurement distance of 3 meters. Desktop EUT are placed on a wooden stand 0.8 meter in height. The measurement antenna is 3 meters from the EUT. The test setup in anechoic chamber is the same as open site. The turntable rotated 360°C. The antenna height is varied from 1-2.5m. The primary objective of the radiated measurements in the anechoic chamber is to identify the frequency spectrum in the absence of the electromagnetic environment existing on the open test site. The frequencies can then be pre-selected on the open test site to obtain the corresponding amplitude. The initial scan is made with the spectrum analyzer in automatic sweep mode. The spectrum peaks are then measured manually to determine the exact frequencies.

Measurements on the Open Site or 10m EMC Chamber

The radiated emissions test will then be repeated on the open site or 10m EMC chamber to measure the amplitudes accurately and without the multiple reflections existing in the shielded room. The EUT and support equipment are set up on the turntable of one of the 3 or 10 meter open field sites. Desktop EUT are set up on a wooden stand 0.8 meter above the ground.

For the initial measurements, the receiving antenna is varied from 1-4 meter height and is changed in the vertical plane from vertical to horizontal polarization at each frequency. Both reading are recorded with the quasi-peak detector with 120KHz bandwidth. For frequency between 30 MHz and 1000MHz, the reading is recorded with peak detector or quasi-peak detector. For frequency above 1 GHz, the reading is recorded with peak detector or average detector with 1 MHz bandwidth.

At the highest amplitudes observed, the EUT is rotated in the horizontal plane while changing the antenna polarization in the vertical plane to maximize the reading. The interconnecting cables were arranged and moved to get the maximum emission. Once the maximum reading is obtained, the antenna elevation and polarization will be varied between specified limits to maximize the readings.

6.3 Appendix C: Test Equipment

6.3.1 Test Equipment List

Location	Equipment Name	Brand	Model	S/N	Last Cal. Date	Next Cal. Date
Conduction	Coaxial Cable 1F-C2	Harbourindustries	RG400	1F-C2	05/20/2006	05/20/2007
Conduction	Digital Hygro-Thermometer Conduct	MicroLife	HT-2126G	ISL-Conduction02	11/30/2004	11/30/2006
Conduction	EMI Receiver 02	HP	85460A	3448A00183	10/01/2005	10/01/2006
Conduction	LISN 01	R&S	ESH2-Z5	890485/013	05/05/2007	05/05/2007
Conduction	LISN 06	R&S	ESH3-Z5	828874/009	12/13/2005	12/13/2006
Radiation	BILOG Antenna 08	Schaffner	CBL6112B	2756	06/07/2006	06/07/2007
Radiation	Coaxial Cable Chmb 02-10M	Belden	RG-8/U	Chmb 02-10M	12/28/2005	12/28/2006
Radiation	Digital Hygro-Thermometer Chmb 02	MicroLife	HT-2126G	Chmb 02	11/30/2004	12/30/2006
Radiation	EMI Receiver 03	HP	85460A	3448A00209	04/01/2006	04/01/2007
Radiation	Spectrum Analyzer 13	Advantest	R3132	121200411	02/17/2006	02/17/2007
Radiation	Horn Antenna 02	Com-Power	AH-118	10088	07/22/2005	07/22/2006
Radiation	Horn Antenna 04	Com-Power	AH-826	081-001	01/13/2006	01/13/2007
Radiation	Horn Antenna 05	Com-Power	AH-640	100A	09/30/2005	09/30/2006
Radiation	Microwave Cable RF SK-01	HUBER+SUHNER AG.	Sucoflex 102	22139 /2	07/07/2005	07/07/2006
Chamber 05	Peak Power Analyzer	HP	8990A	3621A01269	03/28/2006	03/28/2007
Chamber 05	Power Sensor Radar	HP	84815A	3318A01828	03/28/2006	03/28/2007
Radiation	Preamplifier 02	MITEQ	AFS44-00102 650-40-10P-44	728229	11/28/2005	11/28/2006
Radiation	Preamplifier 10	MITEQ	JS-26004000-27-5A	818471	11/22/2005	11/22/2006
Radiation	High Pass Filter 01	HEWLETT-PACKARD	84300-80038	001	N/A	N/A
Radiation	High Pass Filter 02	HEWLETT-PACKARD	84300-80039	005	N/A	N/A
Radiation	Spectrum Analyzer 14	Advantest	R3182	140600028	11/22/2005	11/22/2006

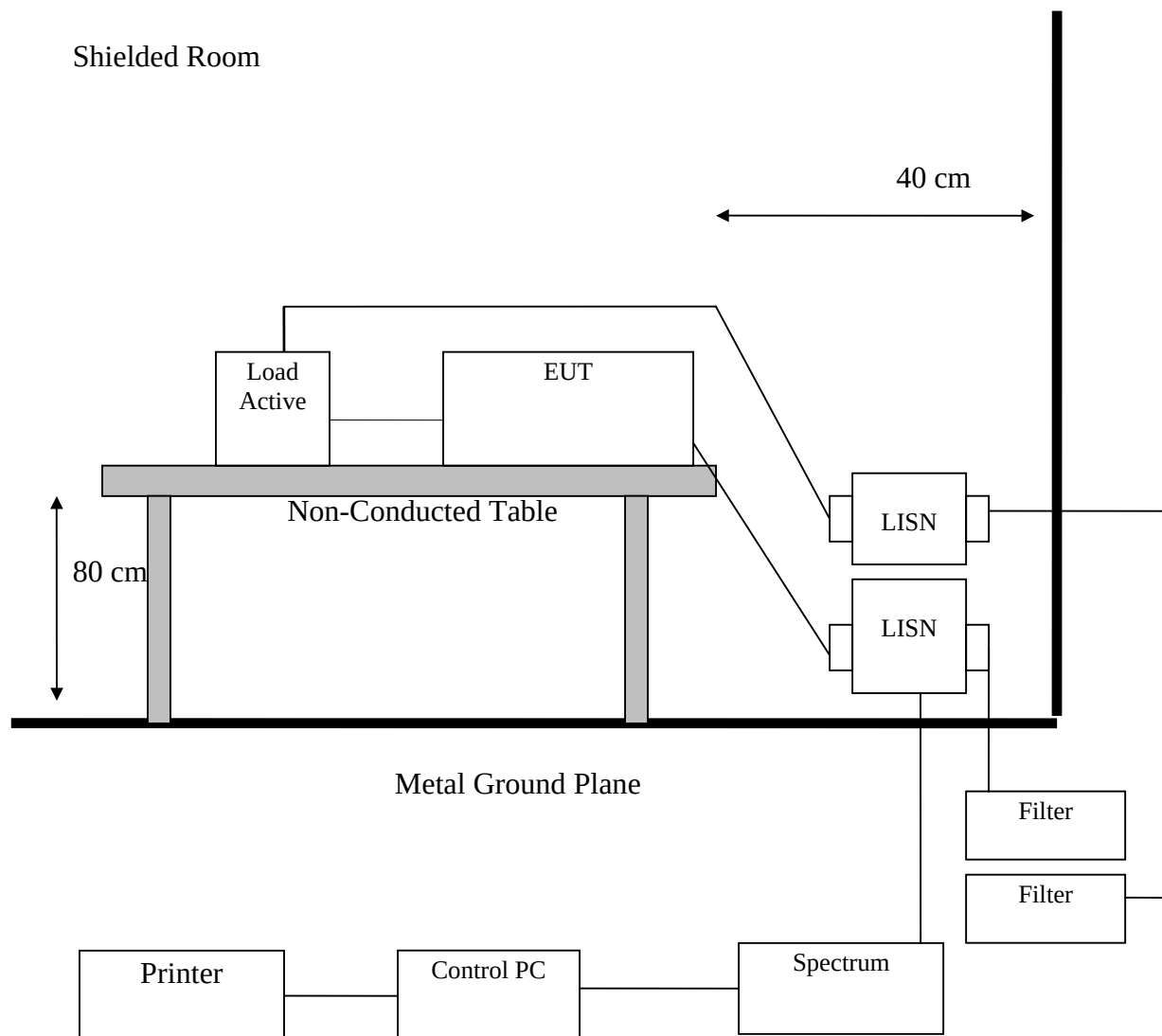
Note: Calibration is traceable to NIST or national or international standards.

6.3.2 Software for Controlling Spectrum/Receiver and Calculating Test Data

Radiation/Conduction	Filename	Version	Issued Date
Conduction	Tile.exe	1.12E	7/7/2000
Radiation	Tile.exe	1.12C	6/16/2000

6.4 Appendix D: Layout of EUT and Support Equipment

6.4.1 General Conducted Test Configuration



6.5 Appendix E: Description of Support Equipment

6.5.1 Description of Support Equipment

Support Unit 1.

Description:	USB Keyboard
Brand:	DELL
Model Number::	RT7D10
Serial Number::	TH-05695W-37171-2B7-1021
Power Cord:	無
FCC ID:	(Complied with FCC DOC)

Support Unit 2.

Description:	Mouse
Brand:	DELL
Model Number::	MO56UC
Serial Number::	N/A
Power Cord::	無
FCC ID:	(Complied with FCC DOC)

Support Unit 3.

Description::	Monitor
Brand:	Philips
Model Number::	201P10
Serial Number:	TY100134004889
Power Cord::	Nonshielded, Detachable
FCC ID:	(Complied with FCC DOC)

Support Unit 4.

Description:	IBM Notebook Personal Computer
Model:	2371
Serial Number:	N/A
Power Supply Type:	Switching AC Adapte 56W Lite-On (Model: 02K6809) 3 pins
CPU Type:	Intel Pentium-M 1.2 GHz
Hard Disk Device:	Hitachi 20GB (Model: HTC424020F7AT00)
DDR: 256MB	Infineon (Model: HYB25D256160BT-6)
BT/MODEM card:	Actiontec (Model: BMDC200)
Wireless card:	Phillips (Model: WLAN 802.11ABG)
930700811107 WW)	
DC-In:	one
VGA Port:	one
USB2.0 Connector:	two
LAN Connector:	one
Modem Port:	one
PCIMCIA Connector:	one
SD Connector	one
Docking Connector:	one
Battery:	Sanyo 4 cell (Model: 92P0999)
Power Cord:	Shielded 3 PIN, 2 PIN
LCD:	Samsung 12.1" XGA TFT (Model:
LTN121XA-L01)	
Maximum display Resolution:	1024X768 Non-interlaced

6.5.2 Software for Controlling Support Unit

Test programs exercising various part of EUT were used. The programs were executed as follows:

- A. Read and write to the disk drives.
- B. The RF software makes the transmitter continuously sending RF signals**
- C. Repeat the above steps.

	Filename	Issued Date
Marvell test software	DutApiCf8385p.exe	2004/10/05

6.5.3 I/O Cable Condition of EUT and Support Units

Description	Path	Cable Length	Cable Type	Connector Type
AC Power Cord	110V (~240V) to AC Power Cord Inlet (3-pin)	1.8M	Nonshielded, Detachable	Plastic Head
Monitor data cable	Monitor to PC VGA port	1.6M	Shielded, Undetachable	Metal Head
USB data cable	USB Mouse to PC USB port	1.8M	Shielded, Undetachable	Metal Head
Keyboard data cable	Keyboard to PC Keyboard port	1.8M	Shielded, Undetachable	Metal Head

6.6 Appendix F: Accuracy of Measurement

Test Site: Conduction 02

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=2	0.104	k=1	0.052
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.330	k=1	0.165
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	LISN Factor Calibration	Normal	k=2	1.200	k=1	0.600
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty Uc(y)	Normal			k=1	0.850
7	Total Uncertainty @95% mim. Confidence Level	Normal	k=2	1.701		

Measurement Uncertainty Calculations:

$$Uc(y) = \text{square root} (u_1(y)^2 + u_2(y)^2 + \dots + u_n(y)^2)$$

$$U = 2 * Uc(y)$$

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS :
The treatment of Uncertainty in EMC Measurement.

Test Site: Chamber 02-3M

Item	Source of Uncertainty	Probability Distribution	Total Uncertainties (dB)		Standard Uncertainty (dB)	
1	Systematic Effects: (Assessment from 20 repeat observation; 1 reading on EUT)	Normal	k=2	0.067	k=1	0.034
2	Random Effects: (Assessment from 20 random observations; 1 reading on EUT)	Normal	k=2	0.103	k=1	0.052
3	Receiver Calibration	Rectangular	k=1.73	1.000	k=1	0.577
4	Antenna Factor Calibration	Normal	k=2	1.700	k=1	0.850
5	Cable Loss Calibration	Normal	k=2	1.000	k=1	0.500
6	Combined Standard Uncertainty $U_c(y)$	Normal			k=1	1.029
7	Total Uncertainty @95% mim. Confidence Level	Normal	k=2	2.059		

Measurement Uncertainty Calculations:

$$U_c(y) = \text{square root} (u_1(y)^2 + u_2(y)^2 + \dots + u_n(y)^2)$$

$$U = 2 * U_c(y)$$

Note: The measurement Uncertainties mentioned above also refer to NIS 81-1994 of NAMAS :
The treatment of Uncertainty in EMC Measurement.

6.7 Appendix G: Photographs of EUT Configuration Test Set Up

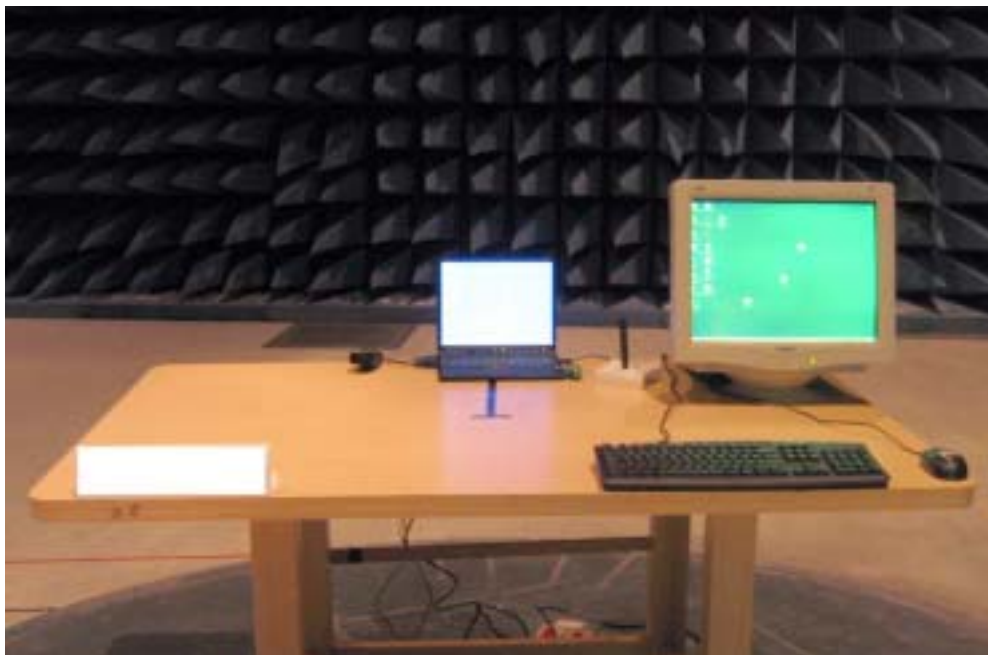


The Front View of Highest Conducted Set-up For EUT

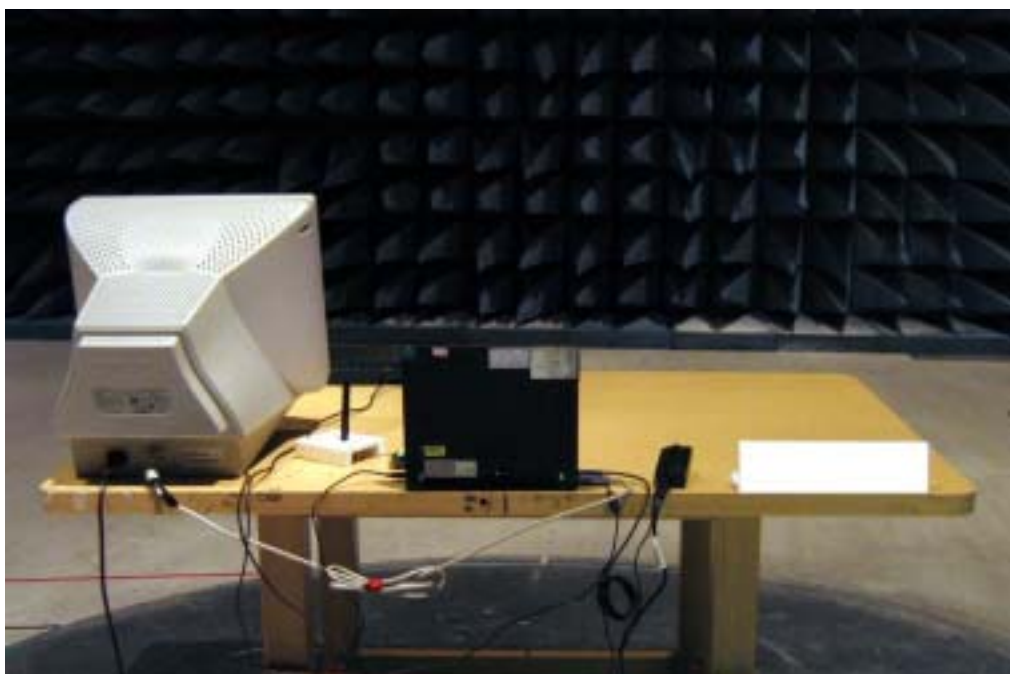
The Back View of Highest Conducted Set-up For EUT



The Front View of Highest Radiated Set-up For EUT



The Back View of Highest Radiated Set-up For EUT



6.8 Appendix H: Antenna Spec.

Please refer to the attached file.